December 2, 1935

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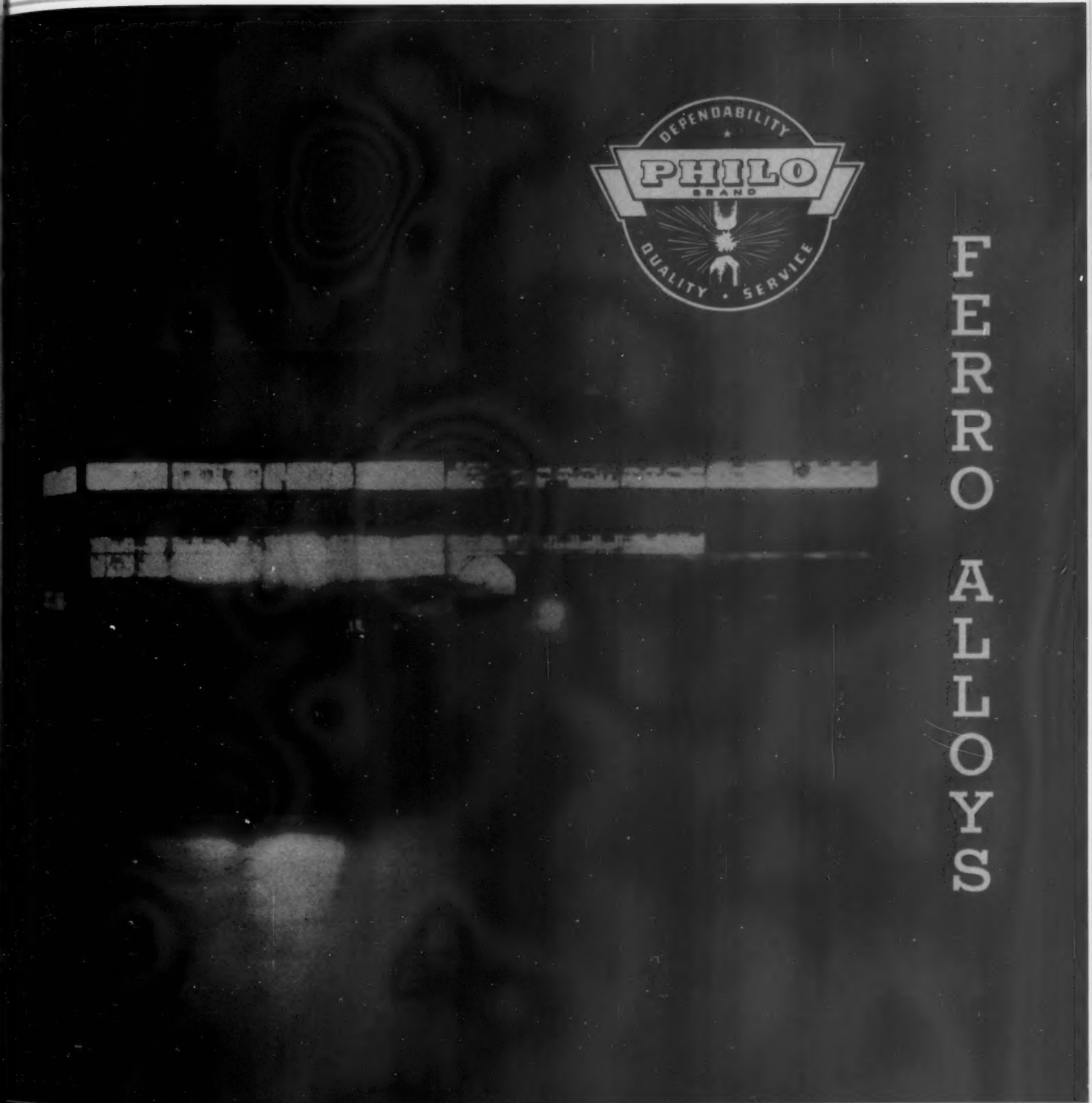

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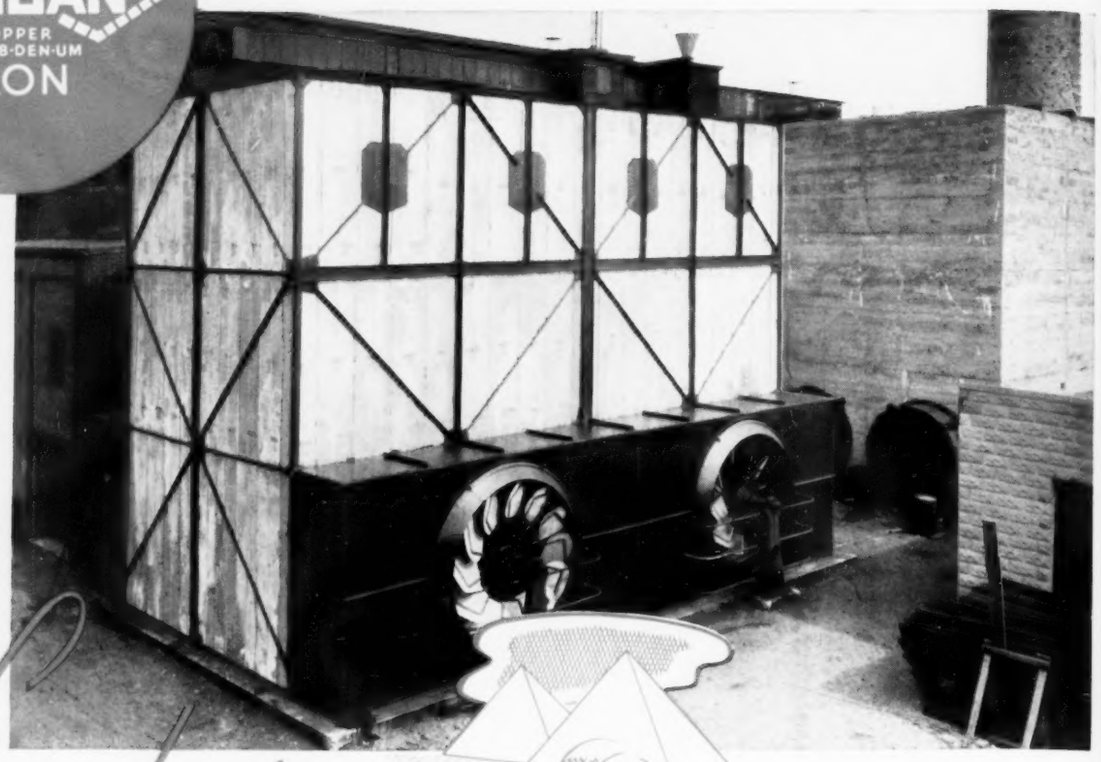

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For forty-eight years—IRON TRADE REVIEW

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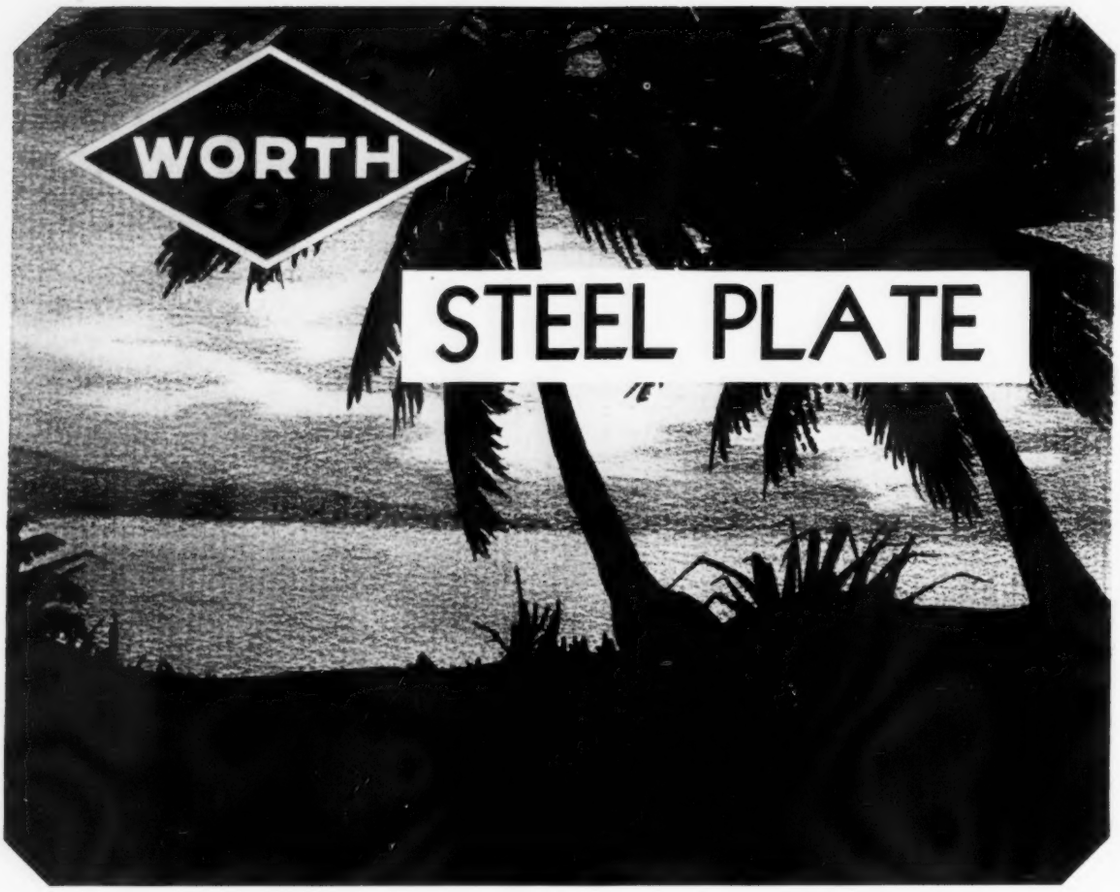

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As the Editor Views the News

EVENTS which will influence relations in the government-industry-labor triangle are progressing rapidly toward an interesting climax. Major Berry, co-ordinator for industrial co-operation, for weeks has been engaged frantically in setting the stage for his Dec. 9 conference. Professional labor, which has been coached privately by the Major, will go to the meeting smarting under the pain of internal discord caused by the disaffection (p. 18) of the powerful John Lewis. Industry, for the most part, will go with its fingers crossed. This is because industry distrusts the motives behind the conference—because the administration still seems to be playing both ends against the middle.

• • •

Cards Stacked for Dec. 9

It is almost a foregone conclusion that certain representatives of professional labor unions will try to show that renewed competition in industry following the abandonment of codes has resulted in the impairment of the rights of employes. They will urge a revival of NIRA or the establishment of a substitute. This is exactly what Major Berry desires. But in the meantime, Secretary Ickes, in making such a fuss (p. 14) over identical bids on public works projects, is attacking a practice that was supposed to be an approved feature of NIRA. Which of these new dealers reflects the official attitude of the administration?

• • •

Why Continue the Farce?

The correct answer is "neither." In the new deal relations with industry there are no official, reliable or lasting attitudes or policies. The administration seems to be adept in keeping in office a sufficient number of spokesmen of widely divergent schools of thought so that when any important issue arises, some administration official will be on hand to support any side of the argument. This may be clever politics, but it does not help industry to trust the motives of its federal administration. President Roosevelt probably has cooled off sufficiently from his "horse and buggy" comment on the Supreme Court decision to know definitely whether or not he should attempt to revive NIRA. The chaos he predicted has not materialized. Instead a substantial improvement in business has developed. Why continue the expense of a pseudo NRA? What a waste of time and money will be this farce of Dec. 9!

• • •

"Tax-Eaters" Get One-Third

Excessive government expenditures—federal, state and local—will become a major issue in 1936. The National Association of Manufacturers will make much of that problem at the annual conclave in New York next Wednesday and Thursday. The public cannot be kidded into laughing off the fact (p. 27) that one-third of the national income goes for taxes. . . . After prolonged uncertainty as to first-quarter prices for finished steel (p. 63) leading producers have reaffirmed the present quotations. This action arouses mixed feelings in the industry, inasmuch the recent advances in pig iron, scrap and semifinished obviously will increase the cost of production. Sharp competition—a normal characteristic for this stage of recovery in any depression—appears to be destined for 1936.

• • •

A Department for "Finishes"

Strip steel consumers are finding that coils shipped on skids (p. 35)—a practice used successfully for years by paper manufacturers—reduces the cost of handling by from 66 to 80 per cent. . . . In an early issue, STEEL will inaugurate a department entitled "Surface Treatment and Finishing" (p. 36), in which the increasing volume of editorial material dealing with this important subject will be given more prominence. . . . Fabricators of stainless steel of the 18-8 chromium-nickel series who have experienced difficulties in welding this material will be interested in an expert's explanation (p. 38) of intergranular corrosion, and in the remedy which lies in the ability of columbium or titanium to "lock-up" or stabilize the carbon and to prevent the structural changes that take place at elevated temperatures.

E. L. Shaner

New Deal Jousts with Steel On PWA Bids, War Exports

WASHINGTON continued to snipe at the iron and steel industry last week as:

PWA Director Ickes unleashed new charges of collusion among steel producers, this time involving bids on piling for a pier at Miami.

The federal trade commission jumped with alacrity into a probe of Mr. Ickes' previous charges of collusion in bids for piling for a terminal at Morehead City, N. C., and the Triborough bridge, New York.

The shipping board bureau of the department of commerce took steps to prevent the sale to Italy, for scrapping purposes, of obsolete merchant vessels in which it has an interest.

Rumors became rife in the state department that congress, on convening Jan. 3, will be asked to broaden and extend the neutrality act, expiring Feb. 29, to include authority to ban exports of steel, scrap and other commodities, as well as "implements of war," to warring nations.

Will Not Attend Conference

Meanwhile, the American Iron and Steel institute, more courageous than some other representatives of industry, was notifying Maj. George F. Berry, co-ordinator for industrial cooperation, that it would neither participate in his industry-labor conference in Washington beginning next Monday nor would it send an observer (p. 21). The conference is generally credited with being the vehicle for attempting to restore NRA.

Mr. Ickes, long a critic of the steel industry and still smarting because he had to back water on sheet piling for the Queens approach to the Triborough bridge, which will now be supplied by the Jones & Laughlin Steel Corp. instead of a German mill, lashed out vigorously against the industry last week in regard to a Miami pier.

For the 3370 tons of piling required, identical bids were submitted by the Carnegie Steel Co., Inland Steel Co., Jones & Laughlin, and the Kalman Steel Co., a subsidiary of the Bethlehem Steel Co., Mr. Ickes charges. These bids were said to be $185,000, delivered. Unlike the Triborough bridge and Morehead City terminal, no foreign material competed. No probe of this situation was specifically demanded by Mr. Ickes, but it was inferred.

Originally this tonnage was to be divided equally among the four bidders. Subsequently it was decided to award Jones & Laughlin the lion's share, but now, if Mr. Ickes keeps his threat, the business will be placed with the mill having the longest haul, which would be Inland. The nearest base on piling to Miami is Pittsburgh, which would necessitate Inland equalizing the freight from there.

There was something akin to gusto in the manner in which the trade commission last week proceeded to act on Mr. Ickes' other charges of collusion, in regard to the Triborough bridge and the Morehead City terminal. In fact, the relationship of the commission with the steel industry has been a series of harassments.

Immediately after the World war the commission undertook to compel the submission of monthly reports of coke, coal and allied producers; the commission won in the courts when steelmakers challenged it, by so narrow a margin it did not pursue its legal victory. The commission also put the industry through a 4-year investigation of the Pittsburgh basing point system, and in 1924 caused adoption of the multiple basing point system which it last year assailed as inadequate.

Mr. Ickes' letter to the White House, charging collusion, was relayed to the commission, which promptly turned it over to its steel experts, three of whom worked on the report condemning the present steel pricing system—Hugh E. White, investigator in the economic section of the commission, and Eugene W. Burr and Walter B. Woodin, both lawyers attached to the legal section.

Report To Be Secret

In view of the fact that the investigation is being made at the direct request of the President there is every reason to believe that it will be held very much in confidence and that little real news of its progress will be made public. If the report finally is made public, its publication will have to be approved by the White House.

The length of time required for the investigation is merely speculation, but the White House angle insures speed. Field work will be necessitated, but the survey will take up only the costs and practices of the four companies involved, which are the same as those under fire for the

(*Please turn to Page* 16)

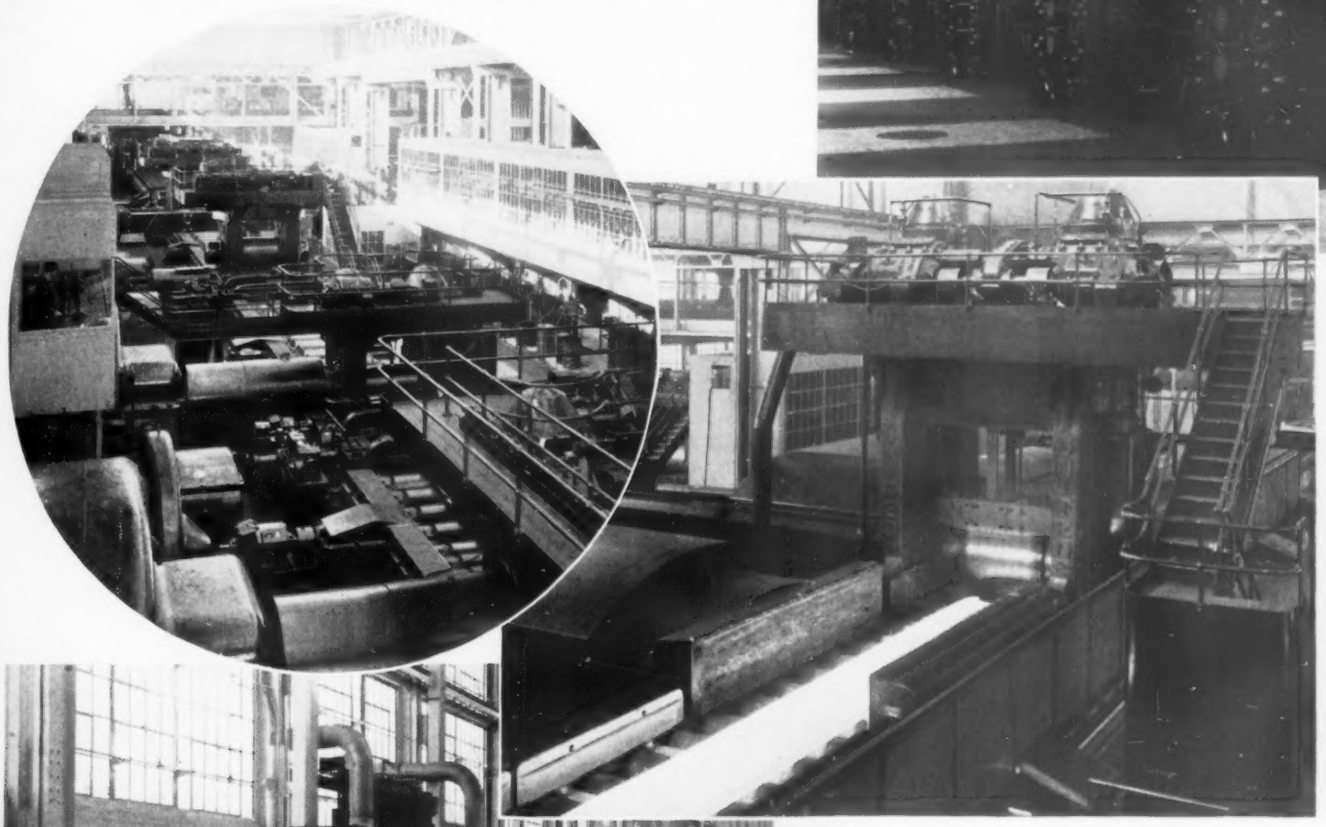
Collusion Hunter

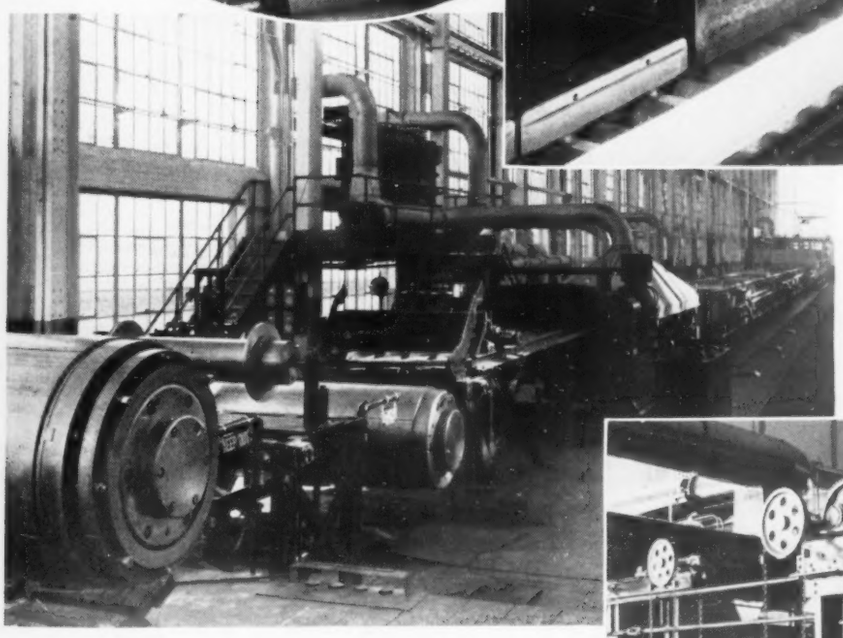
Look at those pudgy fingers, those acquisitive fists, the set jaw, the quizzical eyes, the careless elegance of his clothes. No wonder Harold L. Ickes, secretary of the interior and PWA director, is the granite headland of the Roosevelt cabinet. Many storms have broken over him, but it is the storm — not he — that breaks. Photo copyright by NEA Service

Ford's New Hot Strip Mill Now Ready for Operation

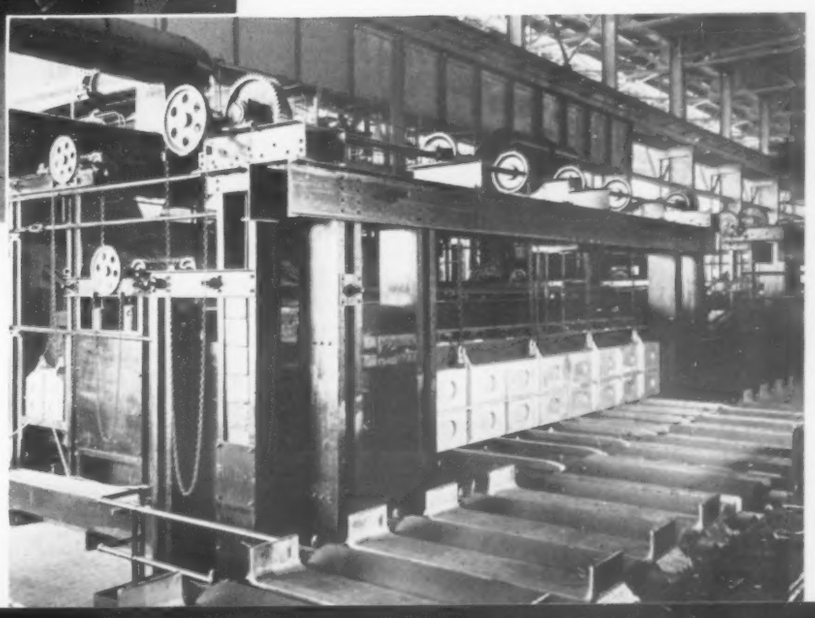
A description of the new mill will be presented in the Dec. 16 issue of STEEL

Right—Finishing mill which includes five 21 and 46 x 56-inch stands of 4-high rolls and delivers at a maximum speed of 1500 feet per minute
Below—Roughing mill which comprises one stand of 2-high and two stands of 4-high rolls. Each of these stands is preceded by edging rolls





Above—Delivery side of 44-inch reversing blooming mill which furnishes slabs to the new continuous hot strip mill and large blooms to the 42 x 32-inch continuous blooming mill built 10 years ago



Above—Shear and reel which serve the heat treating furnace shown in the background. This furnace, 48 inches wide and 227 feet long, is electrically heated and automatically controlled

Right—Only two slab reheating furnaces are installed but provision has been made for a third unit. One is equipped with tile recuperators and the other with a carborundum tubular type unit

New Deal Jousts With Steel

(*Continued from Page* 14)

Miami situation. If collusion is "proved," action by the department of justice would seem a logical sequel.

The commission, incidentally, is reaching out for more power over industry. In its annual report it urges tightening up of both the federal trade and Clayton acts. It recommends that section 5 of the trade commission act be amended to specifically prohibit not only unfair methods of competition in commerce but also unfair or deceptive acts and practices, so as to give the commission clear jurisdiction over a practice which is unfair or deceptive to the public, but may not necessarily be unfair to a competitor. Other recommendations suggested are clarification of the Clayton act with respect to price discrimination and corporate acquisitions of competitors' capital stock.

So far as known, the pressure exerted by the shipping board bureau to cut off one source of scrap to Italy affects only one ship. What is far more important is the impatience of the state department over continued exportation of scrap to Italy and the possibility that the neutrality act may be broadened in scope to prevent abnormal shipment of what might be termed material of war. What normal shipments of scrap to Italy might be would be difficult to ascertain, as in few months of the past year or more has it taken less than 40,000 tons.

Japan in Similar Position

As a matter of fact, Italy is not the leading buyer of scrap in the United States. Japan is in first place, and as the state department views it Japan is doing in northern China and Manchukuo substantially what Italy is attempting to do in Ethiopia. In October, for example, Japan purchased 46,408 tons of scrap in the United States, and Italy 44,301 tons. If exports to the United Kingdom (19,781 tons) and to Canada (16,054 tons) are lumped together the total is not far short of Italy's.

Speaking of exports, the total for all products from the United States in October was 238,358 gross tons, or a decline of 2.5 per cent from September. This loss was occasioned by a lessening in scrap; other products than scrap increased. In 10 months of 1935, exports have totaled 2,622,825 tons, or 18.5 per cent more than in 1934.

Imports in October, however, expanded 12 per cent to a total of 59,569 tons, and for 10 months of 1935 are up 28.9 per cent over last year, to 358,824 tons.

Canadians were confronted last

(*Please turn to Page* 87)

FOREIGN TRADE OF UNITED STATES IN IRON AND STEEL

Gross Tons

	1935		1934	
	Imports	Exports	Imports	Exports
Jan.	22,784	262,740	22,653	178,023
Feb.	28,905	228,537	25,407	151,184
Mar.	21,409	323,035	38,393	261,269
April	28,866	205,336	26,862	201,539
May	47,719	286,598	29,465	241,753
June	33,208	289,687	24,848	219,406
July	31,894	296,802	17,676	233,186
Aug.	31,312	247,312	32,418	242,947
Sept.	53,158	244,419	23,847	301,330
Oct.	59,569	238,358	20,202	220,209
10 mo.	358,824	2,622,825	261,812	2,250,498
Nov.	.....	.....	35,272	299,263
Dec.	.....	.....	19,708	282,655
Total	.....	.....	316,761	2,832,764

ORIGIN OF OCTOBER IMPORTS

Gross Tons

	Pig iron	Manganese ore	Ferromanganese
Germany	358	10	.....
Chile	.....	654	.....
Netherlands	6,366	.....	.....
Brazil	.....	3,507	.....
Norway	102	.....	2,167
U. S. S. R.	3,735	4,947	51
United Kingdom	1,050	.....	76
Gold Coast	.....	4,300	.....
France	.....	.....	25
Canada	2,427	.....	4,171
Italy	.....	.....	50
British India	3,130	5,796	.....
Total	17,169	19,214	6,590

	Sheets, skelp and sawplate	Structural steel	Steel bars	Hoops and bands
United Kingdom	3	1	.....	.....
Belgium	516	2,650	.....	1,236
France	.....	688	.....	154
Germany	1,416	926	.....	1,181
Sweden	4	.....	141	5
Total	1,939	4,265	141	2,576

UNITED STATES IMPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Article	Oct., 1935	Sept., 1935	Jan. thru Oct.,'35
Pig iron	17,168	14,357	99,098
Sponge iron	123	149	1,089
Ferromanganese and spiegeleisen (1)	6,540	4,256	31,668
Ferrochrome (2)	.....	.....	1
Ferrosilicon (3)	34	54	694
Other ferroalloys (4)	.....	.....	1
Scrap	11,129	11,226	38,371
Steel ingots, blooms, etc.	361	340	1,962
Concrete bars	76	494	2,580
Hollow bar, drill steel	141	177	1,001
Merchant steel bars	.....	39	3,439
Iron slabs	.....	.....	.....
Iron bars	254	14	1,414
Wire rods	2,475	1,495	12,882
Boiler and other plate	3	97	487
Sheets, skelp, saw plate	1,939	2,189	9,461
Tin plate	18	18	174
Structural shapes	4,265	2,766	32,155
Sheet piling	225	.....	225
Rails and fastenings	1,118	154	4,193
Cast iron pipe, fittings	3	.....	30
Malleable iron pipe fittings, advanced	.....	.....	46
Welded pipe	678	1,479	3,857
Other pipe	1,295	1,881	13,679
Cotton ties (5)	835	2,347	8,136
Other hoops and bands	1,741	2,525	17,709
Barbed wire	2,935	1,931	21,284
Round iron, steel wire	367	308	33
Telegraph and telephone wire	2	.....	23
Flat wire, strip steel	214	161	1,492
Wire rope and strand	178	190	1,582
Other wire	212	132	1,095
Bars, solid or hollow	2,448	1,944	11,578
Nails, tacks, staples	2,640	2,237	17,322
Bolts, nuts, rivets	6	6	239
Horse and mule shoes	18	46	509
Castings and forgings	128	146	1,064
	59,569	53,158	358,824

(1) Manganese content.
(2) Chrome content.
(3) Silicon content.
(4) Alloy content.
(5) New class. No comparable figures for 1934 or previous years.
(6) New classification as result of the Reciprocal Trade Agreement with Belgium. No comparable figures for previous month or year.

UNITED STATES EXPORTS OF IRON AND STEEL PRODUCTS

Gross Tons

Article	Oct., 1935	Sept., 1935	Jan. thru Oct.,'35
Pig iron	125	451	2,689
Ferromanganese and spiegeleisen	47	1	89
Iron and steel scrap	145,850	170,486	1,797,468
Tin plate scrap	2,108	2,483	32,759
Waste-waste tin plate	2,489	883	18,661
Ingots, blooms, etc.	1,609	1,540	36,804
Bars, iron	132	79	921
Bars, steel	6,176	3,382	45,018
Bars, alloy steel	357	337	2,217
Wire rods	2,473	2,200	21,351
Boiler plate	55	107	1,180
Other plate, not fab.	4,764	3,935	33,211
Skelp, iron or steel	13,212	2,894	45,489
Iron sheets, galv.	237	219	1,632
Steel sheets, galv.	4,211	5,039	59,417
Steel sheets, black	5,646	7,858	83,220
Iron sheets, black	594	469	4,689
Strip steel, cold-rolled	2,895	1,321	16,257
Strip steel, hot-rolled	1,908	2,045	20,727
Tin plate and taggers' tin	12,444	11,397	99,959
Terne plate	270	162	1,983
Tanks, except lined, etc.	401	375	5,095
Shapes, not fab.	3,649	4,194	28,488
Shapes, fabricated	605	1,185	13,757
Plates, fabricated	86	184	1,224
Metal lath	92	75	702
Frames, sashes and sheet piling	269	369	4,005
Rails, 50 lbs. and over	1,504	3,236	36,641
Rails, under 50 lbs.	7	26	2,911
Rail fastenings	466	352	4,480
Switches, frogs, crsgs.	54	178	1,138
Railroad spikes	141	209	2,025
Railroad bolts, nuts	38	79	431
Boiler tubes, seamless	765	839	7,014
Boiler tubes, welded	28	53	589
Casing and oil line pipe, seamless	1,068	693	16,986
Do. welded	438	285	4,393
Seamless black pipe, other than casing	227	279	2,395
Malleable iron screwed pipe fittings	387	247	2,964
Cast iron do.	230	178	1,609
Cast iron pressure pipe and fittings for	2,340	1,854	9,937
Cast iron soil pipe and fittings for	210	827	3,544
Welded black steel pipe	1,146	1,268	14,009
Welded black wrought iron pipe	170	119	1,839
Welded galv. steel pipe	774	1,287	14,311
Welded galv. wrought iron pipe	88	167	916
Riveted iron or steel pipe and fittings	14	43	367
Plain iron or steel wire	2,342	1,069	13,916
Galvanized wire	2,481	1,479	18,587
Barbed wire	3,490	1,629	25,990
Woven wire fencing	181	155	1,745
Woven wire screen cloth	95	73	873
Wire rope	196	307	3,300
Other wire mfrs.	538	298	4,312
Wire nails	1,041	830	8,981
Horseshoe nails	62	64	517
Tacks	43	40	346
Other nails, staples	225	190	2,256
Ordinary bolts, mach. screws, rivets, washers	538	575	5,386
Iron castings	855	431	7,520
Steel castings	164	298	2,299
Car wheels and axles	1,543	449	14,114
Horseshoes	3	8	153
Iron and steel forgings, n. e. s.	762	632	5,621
	238,358	244,419	2,622,825

This Apprentice System Was Depression-Proof

BY FRANKLIN R. HOADLEY
Vice-President, Farrel-Birmingham Co.

GIVING a boy a job at 40 to 45 cents; guaranteeing him steady work, and regular wage increases during his apprenticeship; training him in foundry practice, and offering him an opportunity for further education, for skilled operations, foremanship and superintendence—

These are features of the apprentice system at the Farrel-Birmingham Co.'s plant, Ansonia, Conn., and described by Mr. Hoadley at the National Founders association's convention in New York, Nov. 20-21.

The company carried through this plan during the depression, demonstrating its faith in the fundamentals of it—giving young men a chance to show what they can do, for themselves and the company. Mr. Hoadley's description follows:

THE Farrel-Birmingham apprentice system has consisted of a 4-year training period under careful direction of superintendent and his foreman. We have a starting rate of 40 cents per hour for foundry apprentices who must have at least a grammar school education. An older boy with high school education is started at 45 cents. It has always seemed foolish to us to try to attract the right type of boy into the foundry at a rate lower than that paid to common labor.

The new apprentice is promised a raise of 3 cents per hour every six months, if his work is satisfactory. On that basis his pay is increased 6 cents per annum or 24 cents in four years. However, his eighth or final raise is 5 cents per hour, so that at the end of his training period he receives 55 cents per hour.

Good Work Rewarded

Some flexibility is considered necessary in order to reward extra merit or to penalize unsatisfactory progress. So the new boy is told that he may receive an occasional 5-cent raise instead of 3 cents, if he does exceptionally well.

On the other hand, if his progress is not up to standard the superintendent delays the raise which is due him, for a period of one month, and urges him to "buck up." At the end of that probationary month, he either gets the increase or gets through.

During the depression, for a period of three years, work was so scarce that we did not put in new apprentices, but throughout these years every apprentice received all of his regular raises, and at a time when no other raises were being granted.

A conscientious effort was made to give the boys an interesting variety of work. At times, of course, this was impossible. The essence of

Franklin R. Hoadley

that simple plan was liberal wages, frequent and assured increases in pay, and a sincere interest on the part of superintendent and foremen. During the 13 years of its operation it has produced some of our best molders and coremakers, and up to a certain point has been highly satisfactory.

This method of apprentice training is still in operation but has been supplemented by a much more intelligent recognition of future demands. For many years we had taken boys from grammar school and taught them how to use their hands, but did nothing for their minds. Obviously, it was a lop-sided training, which gave little or no thought to the future need of intelligent foremen, superintendents and foundry executives.

Not being located in a large city, we did not have access to a vocational school. From time to time classes in mechanical drawing had been arranged, but these were spasmodic. In short, instruction in related subjects had been neglected.

In determining upon an educational training, certain fundamentals were agreed upon. In the first place, it seemed advisable for the boys and the management to share the expense, since it was felt that the apprentice would take more interest in something for which he was paying.

Secondly, in order to assure control of the classroom it was decided that classes would be held during working hours and that the boys would receive their regular wages during that period. And finally, that in lieu of a vocational school, correspondence courses should be combined with supervision and instruction by a trained instructor.

Arrangements were made with a nationally known correspondence school to offer courses to the boys at reduced rates. On the same principle as group insurance, by selling the courses to a large number of apprentices, the correspondence school can offer much lower prices than can be obtained by any individual.

The correspondence courses include the following subjects: Shop economics, mathematics, reading of blueprints, mechanical drawing, English, and such foundry subjects as molding, cupola practice, foundry equipment, casting, elementary metallurgy, and elementary chemistry.

Cost Not Excessive

The boy pays for this course approximately $145 over a period of four years, in weekly payments which are deducted from his pay envelope. If at any time he should be discharged or wish to discontinue his studies, the payments cease at once.

It is evident that the boy pays about 60 cents per week for his instruction, and in the case of the beginner who earns 40 cents per hour, this compares with earnings of $16 for a 40-hour week.

The company pays for the services of an experienced vocational training instructor who is at the plant every Wednesday and Thursday. During the balance of the week he is doing similar work elsewhere in New England. All day Wednesday and on Thursday afternoon he is available for advice and guidance to the boys, and he reads their papers and keeps careful records of students' progress.

The school meets three hours every Thursday morning, from 8 until 11. The class is held in an adequate room where every boy has a desk, and with the instructor in charge. In contrast with the 60 cents per week paid by each boy to the correspondence school, the company pays the boys their regular

wages, up to a top limit of 64 cents an hour, for the 3-hour period and also, as previously stated, pays the instructor.

Another popular feature of the classroom period is the occasional appearance of an executive of the company who may talk to the boys on subjects ranging from cost accounting to current economic conditions. This gives the officers of the company an opportunity to prove to the boys their great interest in their advancement. They are told frequently of the future need of mechanics and supervisors and are impressed with fine opportunities ahead of them.

Cover Various Departments

As a further means of sustaining their interest, the apprentices are transferred to other departments for brief periods. It is not the intention that they shall spend sufficient time in the pattern shop or machine shop to learn very much about these trades, but they will at least have an idea of what procedure and operations precede the arrival of the pattern in the foundry, and something about what happens to the castings after they leave the foundry. And they learn at first hand the effect of poor castings on machine shop costs.

According to the present schedule, each foundry apprentice will spend six weeks in the engineering department, four weeks in the pattern shop, eight weeks in the machine shop. Coremaker apprentices must work eight weeks on dry sand and five weeks on green sand. The molder apprentices follow the same idea but with 13 weeks in the core room.

Occasionally, arrangements are made to take all of the apprentices to other factories where they may see our machinery, and their castings, in actual operations. We feel that by supplementing the old manual training system with mental schooling, the average intelligence of the graduate apprentices must improve, and in due course there should result a supply of material for positions as foremen and superintendents.

There is another phase of the classroom instruction of apprentices which is far more important than the points previously covered. Under the New Deal, industry has been slandered and brow-beaten. It has been blamed for the depression. We have been docketed as exploiters of labor without discrimination. For three years this false gospel has been spread before the public.

Our apprentices of today will be the future key men of industry. As skilled craftsmen, foreman or superintendents they will be the leaders of opinion within the ranks of industry. If we sit back and allow them to soak up the propaganda of radicals and demagogues, we shall have only ourselves to blame. Industry has learned that it must fight fire with fire.

Producers of the Future

The apprentices want to hear the truth. If they have been chosen carefully, they are ambitious and eager to learn. They should be told what production means to this country and how it has brought about the highest standard of living in the world. We know that our economic system cannot survive without production.

Then, in training these very men who will be our future producers, is it not our solemn duty to prove to them that future welfare depends not upon restraints to production, but upon every possible encouragement to greater productivity?

If the leaders of industry will make it their business to convince their future leading employes of these economic truths, we need have no fear of our industrial future.

Goodbye Brass, Hail Stainless Bands!

Frank Simon, conductor of the band on the Armco Ironmaster program, is shown trying out a cornet made from stainless steel, said to be the first of its kind. Whether the notes come out as sweetly as they are put in will be determined in a solo by Dr. Simon on the Dec. 2 broadcast. A stainless steel sheet reflects Mr. Simon and his revolutionary musical instrument

Labor

REVIVAL of organized labor's long-frustrated hope of unionizing the iron and steel industry appears nearer through the withdrawal of John L. Lewis, president of the United Mine Workers of America, from the active counsels of the American Federation of Labor.

The most forceful champion of the vertical or industrial type of union, Mr. Lewis has unsuccessfully fought for several years within the federation for campaigns to organize workers in the steel, automobile, rubber, cement, textile, and other mass production industries in one all-embracing union.

In the last two conventions of the A. F. of L. the forces favoring the craft-type of union, including William Green, president of the A. F. of L., have beaten Mr. Lewis. Last week he resigned as vice president, although retaining his membership in the A. F. of L.

Where the Amalgamated Association of Iron, Steel and Tin Workers stands has not been disclosed. Siding with Mr. Lewis are his coal miners and the Amalgamated Clothing Workers, Typographical union, International Ladies' Garment Workers, Oil Field and Gas Well Workers, Hat and Cap Makers, and the Mine, Mill and Smelter Workers' unions.

It is possible that the move to unite the various automobile workers unions into one organization will be furthered, also a consolidation of metal trades unions.

Mr. Green last week warned Mr. Lewis of the peril to organized labor in a schism. New dealers are believed to be in Mr. Lewis' corner of the ring.

GE RESTORES VACATIONS

Vacations with pay for hourly-paid employes of the General Electric Co., abolished several years ago, will be restored in 1936, according to Gerard Swope, president.

HOMESTEAD WORKERS SHARE $80,056 INSURANCE SURPLUS

Approximately 8000 employes in the Homestead, Pa., works of Carnegie-Illinois Steel Corp. will dissolve their old group insurance fund about Dec. 15 when an $80,056 surplus will be distributed. The sum represents an accumulation since the fund was organized nine years ago, and will be dissolved since the members met recently and voted to

transfer their group insurance policies to a plan with a lower rate offered by United States Steel Corp. Under the latter plan, employes pay 75 cents a month for each $1000 policy and the United States Steel Corp. pays the remainder. Distribution of the $80,056 will be made on the basis of length of service.

Meetings

BLAST Furnace and Coke association of the Chicago district will hold its first regular meeting of the 1935-36 season at the Hotel Shoreland, Chicago, at 6:30 p. m., Dec. 2. E. S. Ballard, attorney, will speak on "National Labor Relations Law." Mr. Ballard has acted in an advisory capacity for various steel companies and committees of the American Iron and Steel institute. B. A. Standerline, Wisconsin Steel Works, is secretary-treasurer of the association.

A Sign of the Times!

LAST week the University of Pittsburgh's director of employment placement, J. C. Barton, reported that all members of the 1935 class in metallurgy which had graduated last June had by now found employment in various branches of the steel industry.

SCHEDULE OAKITE CONFERENCE

Field service representatives of Oakite Products Inc., New York, will meet in New York, Dec. 9-13, in their annual technical sales conference.

Dismantling

STAR blast furnace of Star Furnace Co., one of three stacks which made the Jackson, O., district famous for its production of bessemer ferrosilicon and silvery pig irons, has just been bought by the Kulka Iron & Metal Co., Alliance, O., for about $12,000 through a court order. The Kulka company, which is also scrapping the old Leetonia furnace, is preparing to dismantle the old stack and dispose of it for scrap. The stack has been idle since 1923 and has almost fallen in on itself.

The Star furnace was 54 x 14 feet, built in 1866, rebuilt in 1879, and last rebuilt in 1913. The furnace was erected by the late Isaac Brown, and first used raw coal and native iron ore. The company passed through the hands of several generations of the Brown family, its last president being Bernard Kahn, of Cincinnati. In its last days it had producing capacity of 30,000 tons yearly of silvery irons, etc.

Huge Lift Bridge, Nearing Completion, Has Many Remarkable Features

RAPIDLY nearing completion, the huge Buzzards Bay bridge over the Cape Cod canal in Massachusetts, said to be the world's longest lift bridge, has many remarkable features. Fabricated and erected by the Phoenix Bridge Co., Phoenixville, Pa., it is unique not only in its size but because it normally will be kept in the raised position. This is because navigation is heavy while the passage of trains is infrequent.

Among other interesting features is the use of elevators in the towers. Roller bearings are used to support the eight 15-foot diameter sheaves at the top of each tower over which pass eighty 2¼-inch diameter ropes, totaling three miles in length, which connect the counterweights to the span. Another unusual feature is the use of synchro-tie hook-up of the electric motors, located at the top of each tower, which operate the bridge.

Length Is 544 Feet

In the accompanying illustration is shown the increased channel width now required for navigation. The old 160-foot movable bridge, shown in center foreground, provides a 140-foot clear channel for boats. The new span, shown in its raised position, has a length, center to center of bearings, of 544 feet and will provide a 400-foot clear channel for a vertical height of 139 feet above mean sea level. It is 69 feet deep, center to center of chords at the center and is 27 feet wide, center to center of trusses. The tower spans which flank the lift span are each 127 feet 4 inches long, 33 feet wide and 268 feet 8¾ inches high from mean sea level to the top of the ornamental spires on each tower.

Superstructure of the bridge contains 2144 tons of carbon steel, 2248 tons of silicon steel of the structural grade, 547 tons of machinery and 99 tons of miscellaneous steel. Total moving load, exclusive of machinery, when raising or lowering the span, is 4450 tons.

Built as PWA Project

Constructed by the United States government as a PWA project, the work is being handled by the war department, corps of engineers. Col. John J. Kingman, district engineer, Boston, has direct charge. The bridge was designed by Parsons, Klapp, Brinckerhoff and Douglas, consulting engineers, New York.

On completion, the New York, New Haven & Hartford railroad traffic to points on Cape Cod will be transferred from the old to the new bridge, after which the old span will be dismantled and the dredging of the canal completed.

More than 300 engineers, at a recent meeting of the Philadelphia section, American Society of Civil Engineers, listened to a description of the new bridge, accompanied by lantern slides, given by William H. Ellis, Phoenix Bridge Co. Presided over by Lester L. Lessig, contracting engineer at Philadelphia for McClintic-Marshall Corp., Bethlehem, Pa., the meeting also was featured by the showing of a sound film, by S. H. Yorks, Bethelehem Steel Co., Bethlehem, depicting the manufacture of structural steel shapes and specialties.

New span, shown in raised position, is 544 feet long and provides a 400-foot clear channel for navigation, with a vertical clearance of 139 feet above mean sea level. It will supplant the old 160-foot movable bridge shown in center background

Production

STEELMAKING continued its upward swing last week, rising 1½ points to 56 per cent, the peak for the year. Increases in the Chicago, Youngstown, Cleveland, Buffalo, and Birmingham districts more than offset declines in Pittsburgh and New England, while other territories remained firm. A slight bulge in the rate may be looked for this week if tentative schedules at both Chicago and Youngstown are carried out. Further details follow:

Youngstown—Gained 2 points last week to 58 per cent, and indications point to a 60 per cent rate this week on the basis of tentative schedules.

Detroit—Held at 94 per cent last week, one producer melting in all eight and another in eight out of nine.

Chicago—Expanded 1½ points to 62½ per cent, the fourth consecutive weekly upturn. This rate has been exceeded during only three previous weeks this year. A decrease of more than 5 points is in prospect for this week, however, since one interest will shut down a bank of furnaces in order to make changes in a blooming mill. Blast furnace schedules are unchanged with 19 of 41 stacks continuing active.

Wheeling—Unchanged through last week at 78 per cent, with 29 out of 37 open-hearth furnaces on schedule.

Cleveland-Lorain—Up 2 points to 82 per cent, National Tube Co., Lorain, lighting 1 more open hearth to operate 11 of its 12 units; Republic Steel Co.'s Corrigan-McKinney plant continuing with 13 of 14; and Otis Steel Co., with all of its 8. Ingot production continued through the Thanksgiving holiday, although finishing operations slowed up temporarily. At Lorain the bessemer department is on double turn.

Pittsburgh—Off 1 point to 45 per cent last week, as ingot rates began to slacken for both Corporation subsidiaries and the independents. The announcement that steel prices will be unchanged for the first quarter forecasts a generally unchanged ingot rate locally for the next 20 to 30 days. Had prices been advanced, the ingot rate would have mounted rapidly through December.

Twenty-seven out of 60 steelworks blast furnaces are now operating. Carnegie-Illinois Steel Corp. blew in a Clairton blast furnace, Nov. 26, giving the company 12 active stacks among six works. Jones & Laughlin Steel Corp. is operating 8 of 11; National Tube Co., 1 of 4; American Steel & Wire Co., Pittsburgh Crucible Steel Co., and Pittsburgh Steel Co., each 1 of 2, and Bethlehem Steel Co., 3 of 7 at Johnstown, Pa.

New England—Off 3 points to 90 per cent, and if tentative schedules are carried out, a rebound is expected this week. One works is on full.

Birmingham—Up 9½ points last week to 56 per cent, due to increased activity in several departments of the larger steelworks. Seven open-hearths are in shape and can be brought into service as needed.

Buffalo—Advanced 3 points to 40 per cent, owing to the addition of one open hearth. Fifteen open hearths are now in operation and all will probably continue to turn out steel for the next few weeks.

Central eastern seaboard—Unchanged at 39 per cent last week, and this rate is likely to be sustained this week. Despite reaffirmation of prices, finished steel specifications are holding up well.

Steelmaking Operations

Percentage of Open-Hearth Ingot Capacity Engaged in Leading Districts

	Week ended Nov. 30	Change	Same week 1934	Same week 1933
Pittsburgh	45	— 1	20	22
Chicago	62½	+ 1½	33½	28
Eastern Pa.	39	None	18½	17
Youngstown	58	+ 2	35	35
Wheeling	78	None	54	51
Cleveland	82	+ 2	46	48
Buffalo	40	+ 3	24	30
Birmingham	56	+ 9½	27½	20
New England	90	— 3	47	75
Detroit	94	None	48	36
Average	56	+ 1½	28	29

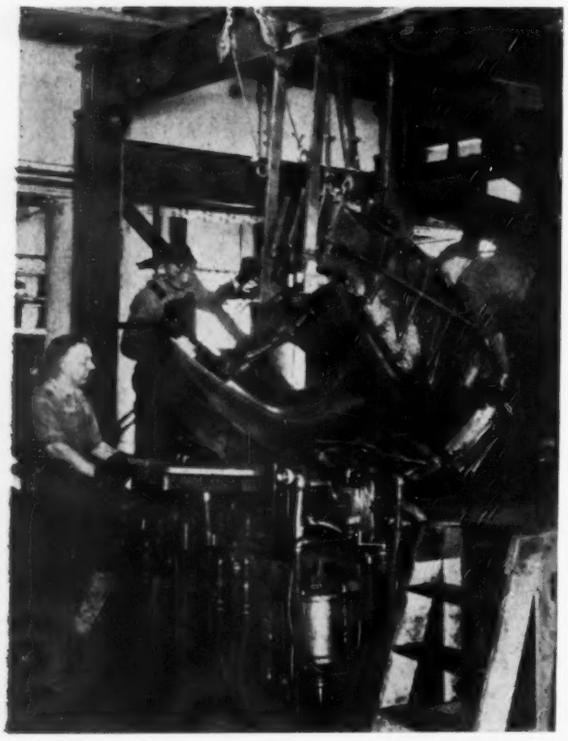
CANADIAN STEEL OUTPUT UP AS PIG IRON DECLINES

Canadian production of iron and steel ingots and castings in October was 95,016 tons, highest total for any month since March, 1931, and compares with 90,952 tons in September, and 57,975 tons in October, 1934. The ten-month total was 742,720 gross tons.

Pig iron output declined from 54,360 tons in September to 45,521 tons in October, and compares with 46,573 tons in October last year. For the ten months ending with October a total of 464,585 tons was produced, against 325,663 tons for the corresponding period last year.

Output of ferroalloys amounted to 9653 tons, as compared with 4512 tons in September, and 2442 tons in October, 1934. The ten-month total of 47,520 tons, more than doubled the 20,666 tons produced in the same period of 1934.

Stampings Today, Nashes Tomorrow

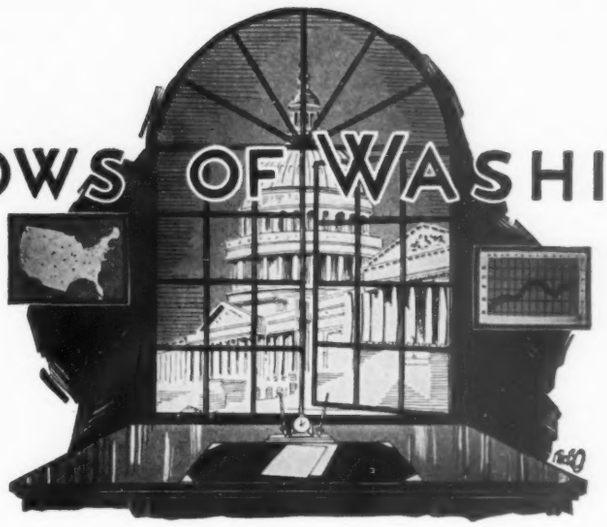


Almost human are the automatic welding machines used in the Seaman Body Corp. division of the Nash Motors Co. A few deft touches are required to place the stampings in the jigs, the control is manipulated, and a body panel results

Mesta Tests Ruling

Federal circuit court of appeals at Philadelphia issued a temporary order Nov. 26, restraining the securities and exchange commission from publicizing trade secrets of large manufacturing concerns. The order was obtained in a suit filed by Mesta Machine Co., Pittsburgh, testing the validity of the commission's order that the so-called trade secrets are public property.

WINDOWS OF WASHINGTON



WASHINGTON

PLANS are being rapidly completed for the Berry industrial-labor conference to be held here on Dec. 9. However, much of the work is what might be termed underground.

For instance, it is said on unimpeachable authority that Major Berry either has asked or is about to ask a number of industrial and labor leaders to form a sort of planning committee "to lend background and character" to the Dec. 9 meeting.

Inquiry at Major Berry's office regarding this move meets an absolute denial although letters already have gone out asking these leaders to act as an advisory committee. It is curicus that any industrial leaders, no matter how enthusiastic they might be about the conference, would care to lend their name for such purpose in view of the opposition in high quarters to the conference.

It is also said here in well-informed circles that Major Berry is most anxious to have this industrial progress council a permanent organization, with himself at the head, which of course would be in direct conflict with the work of Secretary of Commerce Roper's business advisory council.

Major Shows Speed

In connection with Secretary Roper and his attitude toward the conference, it already has been reported in these columns that he is much opposed to it. It has just been learned that Mr. Roper put this matter extremely strongly up to the President on the latter's return from his fishing trip, but that he apparently did this too late.

Major Berry had gone too far with his preparations for the President to ask him to back down, although it is said that the White House would have been mighty glad to have called the conference off.

As the situation stacks up, and on good authority, it appears that Major Berry sold this idea of the conference to the President, who gave his consent without going into it as thoroughly as he should have. The President then went away on his west coast fishing trip, and while he was gone Major Berry made hay while the sun was shining. He went ahead quickly with his plans.

The consequence was when the President returned the major had gone along so far that he could not be called back without extreme embarrassment to himself—and this latter the President refused to bring about.

Institute Voices Sentiment

After several weeks of anxious waiting Major Berry last week received his answer from the American Iron and Steel Institute. The Institute, as the official spokesman of the iron and steel industry, will not participate in the conference; in fact, it will not even send an observer. Said Walter S. Tower, executive secretary of the Institute, in a letter to the major last week:

The Institute has not made any general canvass of the members of the iron and steel industry with respect to their attitude toward the conferences proposed by Major Berry. We assume that many, if not most of them, have received invitations to attend and that they will reply individually as they see fit.

"However, the Institute is aware of the fact that among the leaders of the Industry, representing a major part of the productive capacity, there is a general feeling that sound recovery is at work under the influence of natural economic forces. Those leaders are of the opinion that such recovery in the steel industry probably would be hampered rather than helped by any further legislation designed to regiment business enterprise.

"Under those circumstances it does not seem advisable for the Institute to take any part in conferences which appear to be planned for the purpose of discussing possible further legislative measures relating to business, and no representative will attend."

Nor will any of the major iron and steel companies attend. None is represented on the following list of acceptances from what NRA terms the iron, steel and related industries:

Malleable Founders society, National Malleable & Steel Castings Co., Gray Iron Founders society, A. Leschen & Sons Rope Co., Blaw-Knox Co., Farrel-Birmingham Co., Lebanon Steel Foundry, Concrete Reinforcing Steel institute, Pratt & Letchworth Co., Mt. Vernon Bridge Co., Alan J. Parish, Bartlett-Hayward Co., R. D. Cole Mfg. Co., Chattanooga Boiler & Tank Co., Southern Prison Co., Fowler & Union Horse Nail Co., Horseshoe and Allied Products industry, Hubbard & Co., Drop Forging association, Cast Iron Pressure Pipe institute, American Cast Iron Pipe Co., United States Pipe & Foundry Co., United States Wood Screw Service bureau, Continental Screw Co., Pheoll Mfg. Co., Chicago Rivet & Machine Co., Cornwell & Patterson Mfg. Co., and Warren Webster & Co.

Purpose Still Vague

Major Berry still is having trouble trying to make industry understand just what his conference is about—if he really knows himself. He continues contradictory in his various statements, sometimes making diametrically opposed statements as to the purposes of the conference during the course of the same speech.

"There has been widespread misunderstanding of my purpose in calling this industry conference," he said last week in addressing the Washington Society of Engineers. "It has been described as everything from a revival meeting for the defunct NRA to a scheme to deliver industry bodily to the American Federation of Labor.

"These men who intentionally distort the facts are dealing in silly stuff and approaching these vital questions in a childishly small fashion."

Further in the same speech the major said that "there will be no legislative proposals put forth to this

conference from government sources, or any other plan of action submitted. None has been drafted. This is industry's party. This is a stirring call for industrial statesmanship, of a co-operative brand that has heretofore been lacking too often."

HOLDS GUFFEY TAX OUTSIDE INCOME TAX LIABILITY

It will probably be several weeks before information is made public by the national bituminous coal commission as to what "captive" mines of the steel industry have or have not signed up under the Guffey act with the commission, according to an official of the commission. Up to this date no names of any kinds of mines either signing up or refusing to sign up have been made public.

The commission has announced that the commissioner of internal revenue has ruled in the case of "captive" mines, where the commissioner is authorized to fix the fair market price of coal for the purpose of determining the amount of excise tax levied by the coal conservation act, that such determination has no effect on the determinattion of the income tax liability.

Guy T. Helvering, commissioner of internal revenue, in a communication to the commission, has the following to say on this subject:

"Reference is made to your letter * * * * requesting a statement as to the proposed method of determining the income tax liability of taxpayers who own and operate what are known as 'captive' coal mines in cases where the operator under section 3 of the coal conservation act of 1935 is required by the commissioner of internal revenue to use the fair market value of coal at the mine rather than the contract price as a basis for the excise tax levied by the coal conservation act.

"You are advised that the determination of the excise tax on the basis of the fair market value of the coal has no effect on the determination of the income tax liability."

The national coal commission has just made public its rules of procedure which will govern the conduct of all of its sessions and hearings, and the handling of all compiaints, protests and petitions for relief.

In these rules, the commission has outlined in detail the procedure to be followed by parties or persons who may feel that they are adversely affected by any action of the commission or by any of the district boards.

NEW DEAL LOSES REFERENDUM

A referendum was completed here last week by the chamber of commerce of the United States in connection with trends of federal legislation in which strong opposition was shown.

On the question: "Should there be extension of federal jurisdiction into matters of state and local concerns?", for—45; against—1796.

"Should the federal government at the present time exercise federal spending power without relation to revenue?", for — 22; against — 1845.

"Should there be government competition with private enterprise for regulatory or other purposes?", for —36; against—1825.

"Should all grants of authority by congress to the executive department of the federal government be within clearly defined limits?", for—1813; against—58.

Steel in the News

THANKS to stainless steel, Englishmen in Shanghai and elsewhere in the Far East are able to have their beer as fresh and tasty as at home. English brewers are reported making shipments to them in 5 and 11-gallon containers. English breweries are making beer vats of stainless steel as large as 1000 gallons.

BEER ALSO AID TO TIN PLATE

Beer also is providing a market for Welsh tin plate, Richard Thomas & Co. Ltd., a leading Welsh interest, recently shipped 10,000 base boxes (1000 tons) as a trial order to an American can manufacturer.

Financial

DAVISON COKE & IRON CO., Pittsburgh, plan of reorganization under Section 77-B of the bankruptcy act has been approved by the federal court at Pittsburgh under petition and the plan was presented to the court Oct. 31. Stockholders will meet Jan. 27 to act upon the plan. It is stated that sufficient proxies already have been sent in to assure its approval.

INLAND REFUNDS BONDS

Inland Steel Co., Chicago, has sold to Kuhn, Loeb & Co., New York bankers, an issue of serial bonds to refund the company's outstanding bonds, totaling about $39,600,000.

CLIFFS' PROFIT RISES

Cleveland-Cliffs Iron Co., Cleveland, reports net profit of $911,435 for the first nine months of 1935, against net of $775,489 for all of 1934. This is after all charges.

Says Mutual Understanding Is Vital to Industry

That the industrial management which makes the building of mutual understanding between employer and employe one of its major functions not only enjoys material benefits but also collects unexpected dividends in the form of happier relationships was stated of Bennett Chapple, vice president, American Rolling Mill Co., Middletown, O., in a special industrial session of the tenth anniversary New England conference recently.

"Development and maintenance of a loyal, aggressive organization which believes in its company, to whom work is a pleasure, and to whom extraordinary accomplishment is a personal ambition, is the cornerstone of industrial success," Mr. Chapple declared.

Pointing out that "co-operation is the medium through which all great accomplishments are attained," Mr. Chapple said that through operation of an employe representation plan "a measure of understanding will be developed which will result in real co-operation between management and the organization at large."

Harding Comments On Lewis Article

IN THE following letter to STEEL, Ralph L. Harding, chief, metals and minerals division of the bureau of foreign and domestic commerce, Washington, comments on the article in STEEL for Nov. 11, page 17, by Kenneth B. Lewis, which in turn was a discussion of an article by Mr. Harding appearing in STEEL for March 25, page 13:

To the Editor of STEEL:

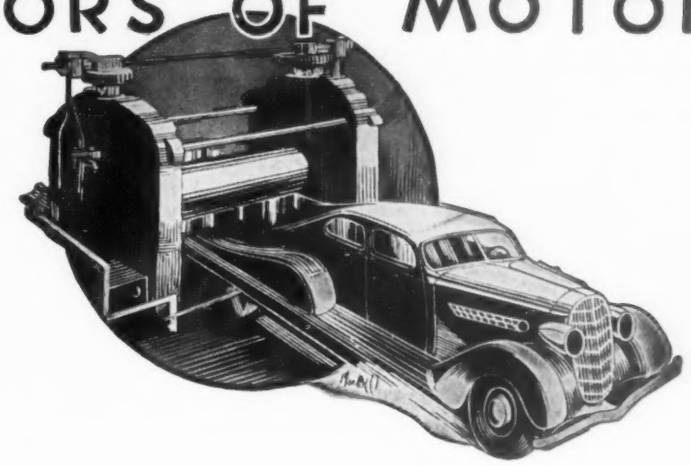
I note with interest the article by Kenneth B. Lewis in this week's issue of STEEL and I completely agree with most of the points which he so ably sets forth. He makes reference to a chart which I prepared and which your magazine reproduced on March 25, 1935, and with considerable justification he sees implications which certainly were not in my mind at the time.

It might be fair to inform Mr. Lewis that the caption "War Unbalances Steel Trend Lines" was no part of my chart or the brief remarks submitted with it but was conceived and added by your editorial staff as indicating the period when the wide divergence of trend lines started.

The exception which Mr. Lewis takes to my statement, "It is possible that the divergence in these trends may be related to the change in type of ownership which took place during those years," would be entirely justified if my intended inferences had been as he sees them. As a matter of fact, this sentence might well have been omitted for it does lend itself to misconstruction. I mentioned it simply because it is one of the least obvious and perhaps least understood of the fundamental changes which took place during those years—and its bearing upon the whole picture is often entirely lost sight of.

Mr. Lewis completely misconstrues my ideas as to "the change in the type of ownership," but there my disagreement with him ends. He has written a clear statement of fact.

MIRRORS OF MOTORDOM



DETROIT

IN DETROIT the labor situation is a subject that is almost taboo and the newspapers minimize labor disturbances that have cropped out at some parts plants and the strike votes that have been taken by employes of some automobile manufacturers, but it is attaining proportions that cannot be ignored by steelmakers and other suppliers to the automobile industry.

Not only is labor restive over its alleged inadequate weekly earnings but it also is being raked by a crossfire from the Mechanics Educational society, the American Federation of Labor, at least one other independent union, and Father Coughlin's weekly radiocasts. The result is widespread disaffection of labor both with itself and with its employers, which a trivial incident might overnight balloon up into an explosion.

Automotive labor generally is now receiving substantially the 1929 hourly rates, but except in isolated cases and at rush periods is restricted to a 40-hour week or about 20 per cent less weekly time than in 1929. At the same time, living costs are rising—which increasingly is grinding labor between the upper and lower millstones of the new deal.

Claim Rates Inadequate

At the plant of the parts manufacturer which one labor organization has been picketing the past ten days, the average hourly rate is 78 cents, which, as wages go in the steel and allied industries, is not bad. At 40 hours a week this nets a worker $31.20, or approximately $130 a month. House rent for a worker in this classification is said to average $30, leaving such a worker a net of about $100 a month for food, clothing, insurance, automobile upkeep, and other items of expense. Labor contends that this is inadequate.

In general, labor rates in Detroit automotive and parts plants are as follows: Power hammer operators, $1.37½ to $1.50 per hour, and helpers $1.25; finishers, 95 cents to $1.05; chassis and final assembly men, 75 to 80 cents; machine operators, 78 to 80 cents.

Each semester the Detroit high schools turn loose several thousand young men, of whom only about 20 per cent go to college. A few of the remainder find office and clerical work, but the great majority eventually wind up in the long cues at plant employment offices.

Many of these are taken on as helpers, especially for assembly lines, at 55 cents to 60 cents an hour. Since a majority live at home and do not pay board, weekly earnings of $22 to $24 for these young men are attractive, and aggravate the competitive position of older men.

Few Can Tie Up Plant

Close as practically all manufacturers keep to their internal labor situation, few can regard themselves as absolutely immune to any possible labor disturbance. The danger, of course, is that one department, although embodying only a small proportion of the total number of workment in a given plant, may strike suddenly and tie up all operations.

There are a few in Detroit who fear that serious labor trouble is ahead. There are others who are convinced that dissension within labor's ranks will prevent any united front. Nevertheless, it cannot be overlooked that labor is being fed a good deal of raw meat these days.

Partsmakers who have been affected in some degree by labor unrest are farming out their contracts among competitors. Automobile manufacturers themselves could not adopt such a policy, and some at least would shut down tightly at the first sign of trouble. If, as, and when this occurs, suppliers will find holdups backing up on them with little warning.

How effectively General Motors licked strike threats directed toward it came to light a few days ago when orders were out from Chevrolet to reopen the Toledo, O., transmission plant. This division, scene of a severe and crippling strike early this year, had been down since the early part of October for inventory.

However, when Chevrolet reopened, it was announced that jobs were available for only 1100 of the 2200 former workers. During the inventory period, General Motors had moved much of the transmission equipment to Saginaw, Mich. Now, Saginaw and Muncie, Ind., as well as Toledo, have Chevrolet transmission capacity.

Later Chevrolet offered to work 1400 of the former 2200 workers four days a week instead of 1100 five days.

Meanwhile, assemblies are continuing at a monthly rate of about 400,000 units. Last week's total of 83,358 was below this average, owing to the Thanksgiving holiday.

The revised total of 275,021 units for October—surpassing all forecasts—puts the 1935 total to date, United States only, for passenger cars and trucks, at 3,204,066, which compares with 2,516,005 for the first ten months of 1934 and 1,778,809 for the corresponding period of 1933.

On the basis of weekly estimates, the November total should be between 350,000 and 375,000, hence the industry comes up to the beginning of December with over 3,500,000 cars already off the lines.

Shipments Hold Steady

Judging from specifications already released for December, shipments of steel and other materials into the Detroit area this month will vary little from November. There is, of course, a variable in the decision of steel producers not to increase prices, and some holdups are likely to be issued by consumers who have anticipated their requirements a little.

Generally speaking, the 1936 models produced thus far have been

moving into consumers' hands. The early introduction undoubtedly will swell the Christmas trade to new heights. Excepting a few makes, dealers stocks are still below normal.

The situation of Hudson-Terraplane, which is enjoying excellent demand, is this: Deliveries in many cases are deferred as much as four weeks, many dealers have practically no stocks, and their salesmen no demonstrators. If Hudson-Terraplane were not to close another order, it would take much of December to catch up with present bookings, and a considerable part of January to bring dealer stocks up to normal.

Not all manufacturers are in this position, but retail sales generally have been brisk enough to indicate a good production situation into January.

Speaking of deliveries, one of the important functions of Detroit representatives of suppliers is to obtain immediate deliveries of cars ordered by their executives in their home offices. Nothing gladdens an automotive purchasing agent's heart so much as to have a supplier seek his intercession for prompt delivery.

Incidentally, no discounts are allowed to suppliers. In fact, all Chrysler and all Ford employes themselves must buy through dealers at the full list price. General Motors, however, still grants its employes certain price preference.

What late January, February, and March bring forth depends pretty largely on general business conditions. Open weather thus far has been a great stimulus and if it continues through December it would be safe to forecast good January assembling.

Show Sales Make Records

Hudson-Terraplane has started a second assembly line and has achieved a daily rate of 700, five days a week. Its orders at the recent Detroit show were three times those of a year ago and this rate of gain was exceeded at the Chicago show. For all makers in fact, the Chicago show shattered sales records. Incidentally, Detroit is doing considerable speculating in Hudson stock.

At a daily rate of just under 5000, Chevrolet is leading the field. Its complete overhauling of the standard model is expected to make this series a serious factor in the low-price field, giving the master series a good run. Four new zone offices have been created, bringing the total to 47 in the United States and giving some indication of this company's expectations for 1936.

Ford has been holding at about 4000 units a day, five days a week. There are indications that some problems in the production of its radiator grilles have not yet been licked, especially in buffing them, but this situation is not serving as a brake on production.

The immediate objective of the Lincoln organization is to get assemblies of the Zephyr up to 100 a day, but last week the rate was 75 to 80 a day. Considerable handwork still is being done on this new series. It is said that orders for 5000 for December delivery are in hand, and that the goal for 1936 is 50,000.

There is no doubt that the introduction of the Zephyr will have a marked effect on design, especially the truss-like frame and the virtual elimination of running boards. To a certain extent Chrysler two years ago did the pioneering in this type of frame with its airflow models, but the blunt nose apparently built up sales resistance.

Packard Planning Changes?

Packard is averaging about 325 units daily, five days a week, chiefly the 120 series. Up to recently most suppliers had a comparatively free run of the Packard plant, but the lid has been clamped on tightly and all visitors are now escorted. This is procedure that normally indicates a change, but there is nothing else to indicate that Packard has anything significant ahead. It is known that recently its engineering staff was doing some preliminary planning, such as most makers have under way at all times, but this was called off suddenly.

Plymouth has pushed production to about 2500 units daily, five days a week, and Dodge up to 1400 daily, also five days. This week Dodge may announce its new line of trucks, production of which has been held up by shortages of material.

Willys, which has been making about 300 jobs a week, is hopeful of achieving a reorganization and continuing a going concern. An echo of the past was heard last week when the machinery and real estate of the Elcar Motor Co., Elkhart, Ind., were sold.

Other weekly rates of production are Auburn 140, Buick 4500, Pontiac 5000, Olds 4300, Graham 700, DeSoto 1300, Chrysler 1000, Reo 325, Hupp 500, Nash and Studebaker each 1500.

Automobile Production

Passenger Cars and Trucks—U. S. Only
By Department of Commerce

	1933	1934	1935
Jan.	128,825	155,666	292,817
Feb.	105,447	230,256	335,700
Mar.	115,272	338,434	429,834
Apr.	176,432	352,975	477,746
May	214,411	330,455	364,727
June	249,727	306,477	361,321
July	229,357	264,933	337,044
Aug.	232,855	234,811	240,051
Sept.	191,800	170,007	89,805
Oct.	134,683	131,991	275,021
10 mo.	1,778,809	2,516,005	3,204,066
Nov.	60,683	83,482	.....
Dec.	80,565	153,624	.....
Year	1,920,057	2,753,111	.....

Estimated by *Cram's Reports*

Week ended:

Nov. 2	76,740
Nov. 9	89,095
Nov. 16	93,177
Nov. 23	94,723
Nov. 30	83,358

Died:

ROBERT TIFFT TURNER, 49, vice president and general sales manager, Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y., in New York, Nov. 13.

Graduated from Cornell university in 1906, he later studied business administration at Harvard university. A veteran of the World war, Mr. Turner saw service in France as a member of the Fifty-second pioneer infantry, which he entered as a private and in which he was later commissioned a second lieutenant. On March 1, 1917, he joined the Shepard Electric Crane & Hoist Co., and was connected with the New York and Philadelphia offices. He was elected secretary in 1927, and was appointed general sales manager the same year. In 1929 he was elected vice president.

♦ ♦ ♦

William Inglis, 69, president, John Inglis Co. Ltd., Toronto, Ont., in Toronto, Nov. 18.

♦ ♦ ♦

Chester A. Croft, salesman for A. M. Byers Co., Pittsburgh, for the past ten years, in Pittsburgh, Nov. 26.

♦ ♦ ♦

Clifford W. East, 47, assistant manager of the Nicholson File Works, Anderson, Ind., in that city recently.

♦ ♦ ♦

Frederick A. Yeager, 62, engineer of the former Cambria Steel Co., Johnstown, Pa., Nov. 21, in Johnstown.

♦ ♦ ♦

Edwin Wilbur Rice Jr., 73, honorary chairman of the board of directors of the General Electric Co., Schenectady, N. Y., in that city Nov. 25. He was one of the pioneers of electrical development in the United States, and, in association with the late Charles A. Coffin, played a conspicuous part in the building of General Electric. He contributed much through organization methods, improved factory routine, technical development, and engineering and scientific inventions.

Industrial Men in the News

C. A. CHERRY has been appointed district sales manager for Republic Steel Corp. in the Buffalo territory, replacing Thomas B. Davies, who has been transferred to Republic's alloy steel division in Massillon, O., as special representative.

After Mr. Cherry's graduation from the Johnstown, Pa., high school, he became connected with the Cambria Steel Co. in the wire sales division. In 1917, when his firm merged to form the Midvale-Cambria Steel Co., he was attached to the Philadelphia office of the new organization. In 1918 he became private secretary to W. H. Donner, head of the Donner Steel Co., and shortly afterward was made assistant vice president in charge of sales. In 1930, when the Donner Steel Co. became a part of Republic Steel Corp., he came to Republic as assist-

C. A. Cherry

ant manager of sales, carbon bar division, which position he held until his transfer to Buffalo.

♦ ♦ ♦

H. S. Landon, formerly vice president of the Pittsburgh Metallurgical Co., has become associated with the Ohio Ferro-Alloys Corp. in the capacity of district manager of the Chicago district, with offices at 1740 Conway building, effective Nov. 15.

Mr. Landon, a graduate of Sheffield Scientific school, Yale university, has had broad experience in the metallurgical field, and wide acquaintance in the district.

♦ ♦ ♦

Sydney Buckley has been elected president of the Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y. Mr. Buckley was formerly vice president and general manager of the Niles division at Philadelphia.

Herbert W. Gledhill, formerly manager of the Philadelphia district office, has been elected vice president and general sales manager. He also will be located at Montour Falls, N. Y.

♦ ♦ ♦

Edward H. Lurker, formerly district manager of the Vulcan Crucible Steel Co., has joined the Chicago district organization of the Cyclops Steel Co.

♦ ♦ ♦

W. W. Hill, superintendent of the bar mills at Duquesne works of Carnegie-Illinois Steel Corp., Duquesne, Pa., has retired after 43 years of continuous service with the Carnegie Steel Co.

Mr. Hill began his career in 1887 with the Westinghouse Air Brake Co., at the Allegheny City, Pa., plant. In 1889 he went with the Pittsburgh Reduction Co., Pittsburgh, which later became Aluminum Co. of America. When this company moved to New Kensington, Pa., Mr. Hill was placed in charge of operations.

In 1892 he became identified with the Homestead steelworks of Carnegie, was later transferred to the Duquesne works, and in 1902 was appointed superintendent of the

Norman D. MacLeod, New President, National Machine Tool Builders Association

With 17 years experience in the machine tool field he is well-equipped to take over this new post.

A native of East Providence, his education and career have centered around this district.

Despite the press of business he finds time to be active in numerous associations and clubs.

NORMAN D. MacLEOD, recently elected president of the National Machine Tool Builders association, at its annual meeting in Hot Springs, Va., is president and general manager of the Abrasive Machine Tool Co., East Providence, R. I., manufacturer of precision grinding machines.

Born in East Providence, in 1891, Mr. MacLeod was educated there and in Providence. He was graduated from Massachusetts Institute of Technology with a degree of bachelor of science. Prior to his affiliation with the Abrasive Machine Tool Co., he spent a two-year training period with Brown & Sharpe Mfg. Co. In the following 17 years he moved up through the organization founded by his father in 1916, serving in various capacities, such as designing, drafting, foreman, superintendent, and management, and on the death of his father, becoming president and general manager. Mr. MacLeod inherits his interest and talent in things mechanical from his father, grandfather, and great uncle.

Mr. MacLeod saw service on the Texas border in 1916 and in France during the World war, with the Twenty-Sixth division. He has been decorated with the Distinguished Service Cross (USA) and the Croix de Guerre with Palm (French).

He is a member of the Technology Club of Rhode Island, Providence Engineering Society, American Society of Mechanical Engineers, and vice president of the Associated Industries of Rhode Island. His clubs include the Agawam Hunt and British Empire clubs.

His hobbies are golf, tennis, boating, and field artillery.

shipping department. Since 1912 he has been superintendent of the Duquesne bar mills.

♦ ♦ ♦

Corey C. Brayton, sales engineer, American Manganese Steel Co., Oakland, Calif., has been inspecting dredging operations in Alaska.

♦ ♦ ♦

Frederick B. Quigley has been appointed general superintendent of the Farrell, Pa., steelworks and blast furnaces of Carnegie-Illinois Steel Corp., succeeding Harry L. Brindle, who has been appointed assistant general superintendent of the Youngstown, O., district. Both appointments were effective Dec. 1.

Mr. Quigley's service with the former Carnegie Steel Co. began Dec. 7, 1908, in the blast furnace department at Youngstown. He was made superintendent of blast furnaces Jan. 1, 1917, superintendent of the open-hearth and bessemer department Jan. 1, 1922, and assistant general superintendent of the Youngstown district on Feb. 1, 1927.

Frederick B. Quigley

Mr. Brindle's service with the Carnegie Steel Co. began in June, 1906, at the New Castle works in the roll department. He was transferred to the Farrell works as assistant master mechanic in 1919, was made assistant general superintendent of the Farrell works on Feb. 1, 1926, and named general superintendent on June 1, 1931.

♦ ♦ ♦

W. S. Shipley, president of the York Ice Machinery Corp., York, Pa., recently was presented with the 35-year service emblem of the corporation by L. S. Morse, president of the Twenty-five Year club, of the York corporation and an executive engineer of the company. Mr. Shipley then presented Mr. Morse with a 40 year emblem. The meeting of the club was attended by more than 300 employes each having a record of 25 or more years of continuous service. E. A. Kleinschmidt, vice president, and a number of outside branch men were initiated as new members.

♦ ♦ ♦

Edward A. Hahl has been appointed to the sales engineering staff of the American District Steam Co., North Tonawanda, N. Y. Mr. Hahl is prominently known in the water heater and heat interchange equipment field, where he has been active for the past 14 years. He will continue to specialize in this field with the American District Steam Co.

♦ ♦ ♦

Thomas S. Hammond, president, Whiting Corp., Harvey, Ill., has been nominated for the presidency of the Illinois Manufacturers' association in 1936. The election will be held at the annual meeting Dec. 10 at the Stevens hotel, Chicago. G. P. Torrence, president, Link-Belt Co., Chicago, has been nominated as first vice president. B. C. Heacock, Caterpillar Tractor Co., Peoria, Ill., has been nominated as second vice president.

♦ ♦ ♦

Coolidge Alexander Karns, graduate of Gettysburg college, and former metallurgist with the Republic Steel Corp., Buffalo, is holder of a fellowship established by the Molybdenum Corp. of America, Pittsburgh, allowing two years of graduate study in the metals research laboratory of the Carnegie Institute of Technology, Pittsburgh. Mr. Karns will study the application of tungsten in alloys.

This is the second fellowship grant to be established. The Aluminum Co. of America made a similar award last year.

♦ ♦ ♦

S. J. Mikina, research engineer, Westinghouse Electric & Mfg. Co., received the junior award of the American Society of Mechanical Engineers at its annual meeting in the Engineering Societies building, New York. The subject of his paper was "Effect of Skewing and Pole Spacing on Magnetic Noise in Electrical Machinery."

Mr. Mikina, upon graduation from the University of Michigan in 1930, entered the student's course of the Westinghouse Electric & Mfg. Co. at East Pittsburgh, Pa., later becoming a member of the research staff, where he specialized in studies concerned with noise and vibration in electrical equipment.

♦ ♦ ♦

Clarence P. Finke, secretary-treasurer of the Optenberg Iron Works, Sheboygan, Wis., resigned Nov. 15 to join the staff of the Milwaukee branch of the C. A. Dunham Co., manufacturer of heating equipment. Mr. Finke was connected with the Optenberg company for 15 years.

♦ ♦ ♦

G. G. Coolidge, vice president, Harbison-Walker Refractories Co., Pittsburgh, has been elected to the board of directors of the Fidelity Trust Co., Pittsburgh.

♦ ♦ ♦

S. L. Felton, general traffic manager, Acme Steel Co., Chicago, has been elected chairman of the industrial traffic council of the Chicago association of commerce.

♦ ♦ ♦

Robert S. Schmieder has rejoined the Milcor Steel Co., Milwaukee, as manager of its metal specialties division. He became connected with the company in 1913 and resigned in 1931 to help organize the Super Steel Products Co., Milwaukee, of which he has been secretary.

Harry L. Brindle

♦ ♦ ♦

Alvin Light, Rochester, N. Y., has been appointed Buffalo representative for the American Monorail Co., 13107 Athens avenue, Cleveland, manufacturer of overhead conveying equipment.

♦ ♦ ♦

Harry A. Schultz, manager of the bureau of safety, sanitation and welfare, United States Steel Corp., New York, has accepted the chairmanship of the steel and iron division of the United Hospital Campaign committee, 14 Wall street, New York.

♦ ♦ ♦

Everett Chapman, vice president of the Lukenweld division of Lukens Steel Co., Coatesville, Pa., will address the Pittsfield, Mass., chapter of American Welding society in the General Electric auditorium, Dec. 2.

Mr. Chapman is the designer of high-duty welded steel structures

(*Please turn to Page* 87)

EDITORIAL

Industry Should Assist in War Against "Tax Eaters"

ONE of the most gratifying aspects of the present trend in the attitude of the American people toward local, state and national governments is their awakening to the consequences of extravagant public expenditures. The persons upon whom the cost of government falls most heavily are beginning to realize the serious burden they must bear. Everywhere throughout the country movements are being started to crystallize sentiment against unduly high taxes and to arouse public officials to the immediate need of more economical government.

This is a campaign in which business and industry should participate wholeheartedly. It is an effort that can be applauded and supported regardless of one's political belief or party label.

Probably no better summary of industry's position on the question of government expenditures has been presented in recent years by a business executive than that contained in the address, "Business, Industry and Taxation," delivered before the American Bankers' association at New Orleans by Lewis H. Brown, president of Johns-Manville Corp. More clearly and more faithfully than any other contemporary writer or speaker, he set forth the attitude of business and industry toward new deal activities.

Briefly, he stated that business and industry are **not** opposed to:

1. Progressive and needed social reforms, providing the method is legal and practical.
2. The principle of regulation of the stock exchanges and the issuance of securities.
3. Government regulations to safeguard banks.
4. Fair treatment of labor.
5. Equality of purchasing power between the farms and cities.
6. The fundamental idea of relief of those who really need help.
7. Old age pensions based upon need, providing they are paid out of current taxation.
8. The principle of a termination wage for employes whose services are no longer needed.
9. Recognition of the human rights of employes
10. Co-operative effort under some such body as the federal trade commission.
11. The theory of large and useful public works expenditures during the bottom of the depression or to the government going into debt for such expenditures, provided they are concentrated in a relatively short time and provisions made for paying off the debt quickly during the next era of prosperity.
12. Devaluation in the monetary system when that is absolutely necessary.
13. The government exercise of its proper functions.
14. The use of intelligence in government.

But, declared Mr. Brown, business and industry **are** opposed to (*compare these points with the foregoing list*):

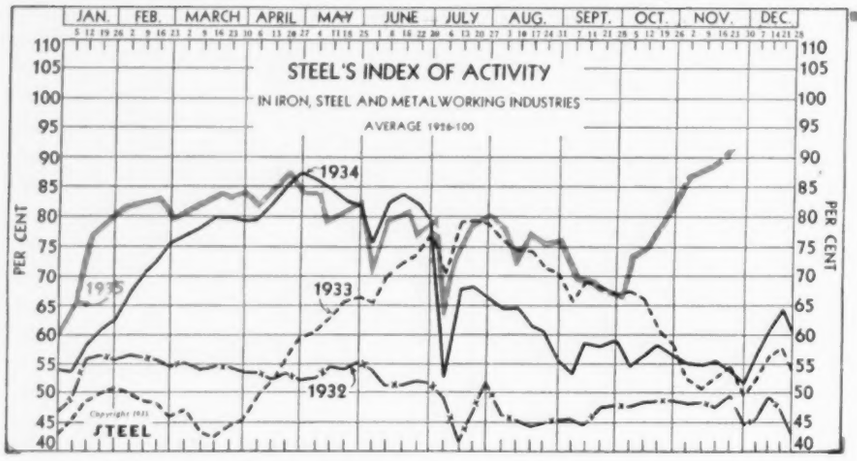
1. Social reforms which in attempting to assist one group of citizens, harm another group.
2. Impractical methods of stock exchange regulation such as attempted by the original authors of the securities exchange act.
3. Centralized political control of the federal reserve board and to political pressure being exercised to force banks to invest the people's money in unlimited quantities of government obligations to support governmental bureaucracy.
4. Federal laws that prohibit the right of a man to work or that attempt to regiment the activity of private enterprise.
5. The basic principle of paying people for what they do not do or of destroying crops while people starve.
6. Methods of handling relief that make it more desirable for people to stay on relief than to take jobs.
7. Old age pensions based on the assumption that they are an inherent right.
8. "Unemployment insurance" which sets up an enormous fund which will result ultimately in providing an additional source for the sale of government bonds to provide billions for bureaucracy to spend.
9. "Social security" set up on an impractical basis, which makes it more difficult for unemployed to get back on a payroll.
10. An effort such as NRA to bring about regimentation.
11. The slowness of PWA and to the waste and extravagance of CWA.
12. The theory that a fluctuating, unstable medium of exchange can ever be a basis upon which long term contracts can be made.
13. The theory that government bureaucracy can operate more efficiently than private enterprise.
14. The idea that a man qualified to head a research department should be placed in charge of factory production.

In short, business favors sound economic and social objectives, but is opposed to the impractical, wasteful methods which in many cases have been proposed to attain them. Business, as well as the public, particularly is opposed to the upward trend in the per capita cost of local, state and federal government which mounted from $33.84 in 1915 to $122.52 in 1934. Today a third of our income is consumed in taxes. Mr. Brown visualized this burden in the following arresting paragraph:

"Today there is an invisible guest who sits at the table of every family in this country. He is the invisible tax eater that collects the hidden taxes. When the housewife purchases three pork chops, the butcher weighs them out but only wraps up two. The third he gives to this invisible guest."

Someone had said that the American Declaration of Independence was the outgrowth of exhorbitant taxes levied by King George III, which amounted to 25 cents per capita. Is not the current tax of $122.52 per capita sufficient justification for a protest that will put the fear of God into the hearts of the money spenders in the temples of bureaucracy?

THE BUSINESS TREND



STEEL'S *index of activity in the iron, steel and metalworking industries increased 2.0 points to 90.8 in the week ending Nov. 23:*

Week ending	1935	1934	1933	1932
Sept. 7	70.9	53.5	65.5	44.9
Sept. 14	70.1	58.7	69.1	47.8
Sept. 21	69.4	58.1	68.2	48.0
Sept. 28	68.5	59.3	66.9	47.7
Oct. 5	73.3	54.7	67.4	48.4
Oct. 12	74.9	56.4	66.0	48.7
Oct. 10	77.4	58.2	60.9	58.7
Oct. 26	82.4	56.3	58.0	48.3
Nov. 2	86.4	55.0	52.3	48.5
Nov. 9	88.4	54.9	50.7	47.7
Nov. 16	88.8†	55.2	52.6	49.2
Nov. 23	90.8*	54.4	55.4	44.5

†Revised. *Preliminary.

The index charted above is based upon freight car loadings, electric power output, automobile assemblies (estimated by Cram's Reports) and the steelworks operating rate (estimated by STEEL.) *Average for 1926 equals 100, weighted as follows: Steel rate 40, and car loadings, power output and auto assemblies each 20.*

Activity Rises in Spite of Unbalanced Support

CONTINUED strength in automobile assemblies, steelworks operations and electric power output, coupled with a slight indicated gain in freight car loadings caused STEEL'S index of industrial activity to rise from 88.8 to 90.8 in the week ending Nov. 23.

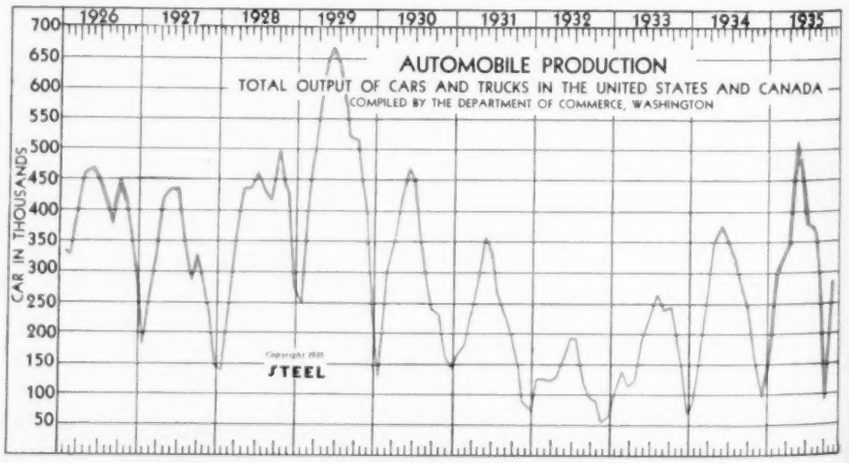
This is the highest point touched in 1935. It exceeds every index number since that of June 28, 1930, which was 94.0. It means that industrial activity today, as measured by this particular index, is at a rate of 90.8 per cent of the average for the year 1926. The average index number for 1929 was 109.6; consequently the present rate is 85 per cent of the 1929 average. It is 70 per cent of the 1929 peak.

These comparisons are startling, particularly when it is realized that the current strong showing has been accomplished without marked support from the building and construction industries. In spite of encouraging improvement, activity in these fields still is at low ebb and the effort of the government to make up for the deficiency in private construction through extravagant expenditures for public works has amounted to little more than a drop in the bucket.

Therefore, industry approaches the year-end with a gratifying rate of activity which is supported unduly by the automobile, home appliance and equipment, container, and some other industries, but lacks the normal support of railroads, building and certain heavy equipment industries.

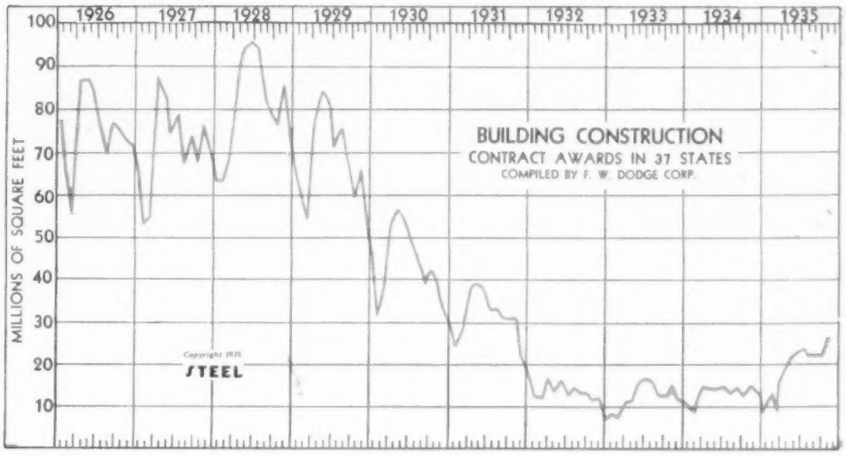
The outlook for improved private construction in 1936 is promising. From now on a better diffusion of activity will be as important as continued gains in the industries which already are enjoying a high rate of activity.

	1935	1934
January	303,372	162,570
February	358,658	238,827
March	451,809	352,614
April	501,837	371,338
May	385,486	350,616
June	377,065	320,382
July	350,118	276,047
August	247,743	244,715
September	95,128	175,586
October	283,334	135,771
November		85,179
December		156,356

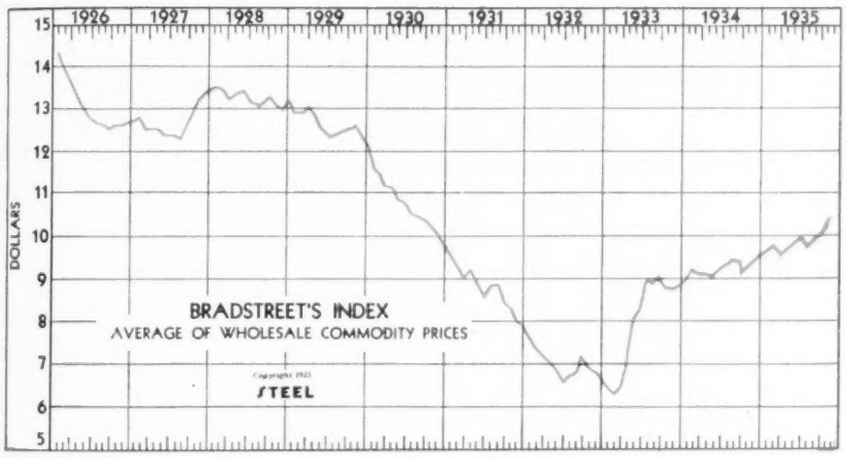


October Building Awards Register Sharp Gain

	Square Feet	
	1935	1934
January	11,245,100	9,568,700
February	9,670,300	8,176,300
March	15,873,100	14,788,900
April	19,981,100	14,207,100
May	22,276,200	14,664,400
June	22,878,800	13,986,500
July	21,565,900	13,250,000
August	21,545,400	14,259,000
September	21,365,700	12,510,300
October	27,775,900	15,098,100
November		12,780,800
December		9,193,300



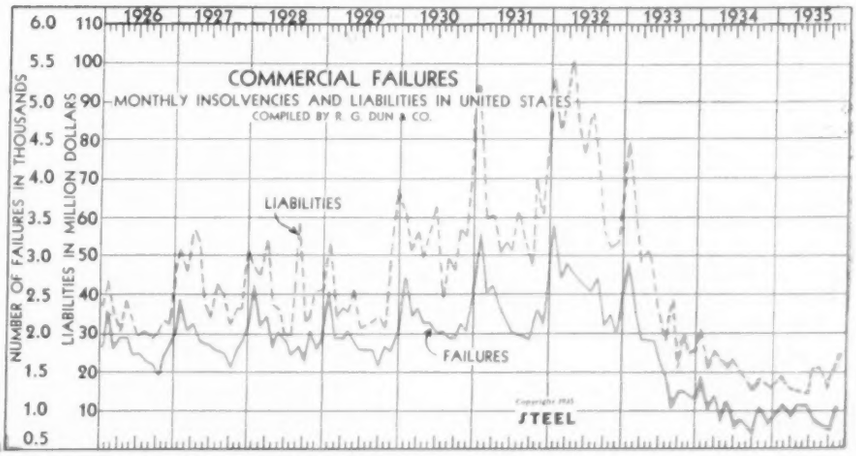
Bradstreet's Commodity Prices Continue Upward



	1935	1934
January 1	$9.49	$9.01
February 1	9.78	9.26
March 1	9.79	9.17
April 1	9.66	9.16
May 1	9.79	9.14
June 1	9.90	9.24
July 1	9.84	9.32
August 1	9.91	9.48
September 1	10.00	9.45
October 1	10.17	9.27
November 1	10.28	9.29
December 1	.....	9.49

Commercial Failures, Liabilities Show Seasonal Rise

	Failures		Liabilities	
	1935	1934	1935	1934
Jan.	1,184	1,364	$18,823,697	$32,905,428
Feb.	1,005	1,049	18,737,657	19,444,718
Mar.	976	1,102	18,522,840	25,786,975
Apr.	1,115	1,052	18,063,923	25,786,975
May	1,027	977	15,669,627	22,560,835
June	961	1,033	20,463,097	23,868,293
July	931	912	20,446,761	19,325,517
Aug.	910	929	17,845,596	18,459,903
Sept.	806	790	21,837,926	16,440,147
Oct.	1,097	1,091	22,243,941	19,968,448
Nov.	.....	923	.....	18,349,791
Dec.	.....	963	.....	19,910,610



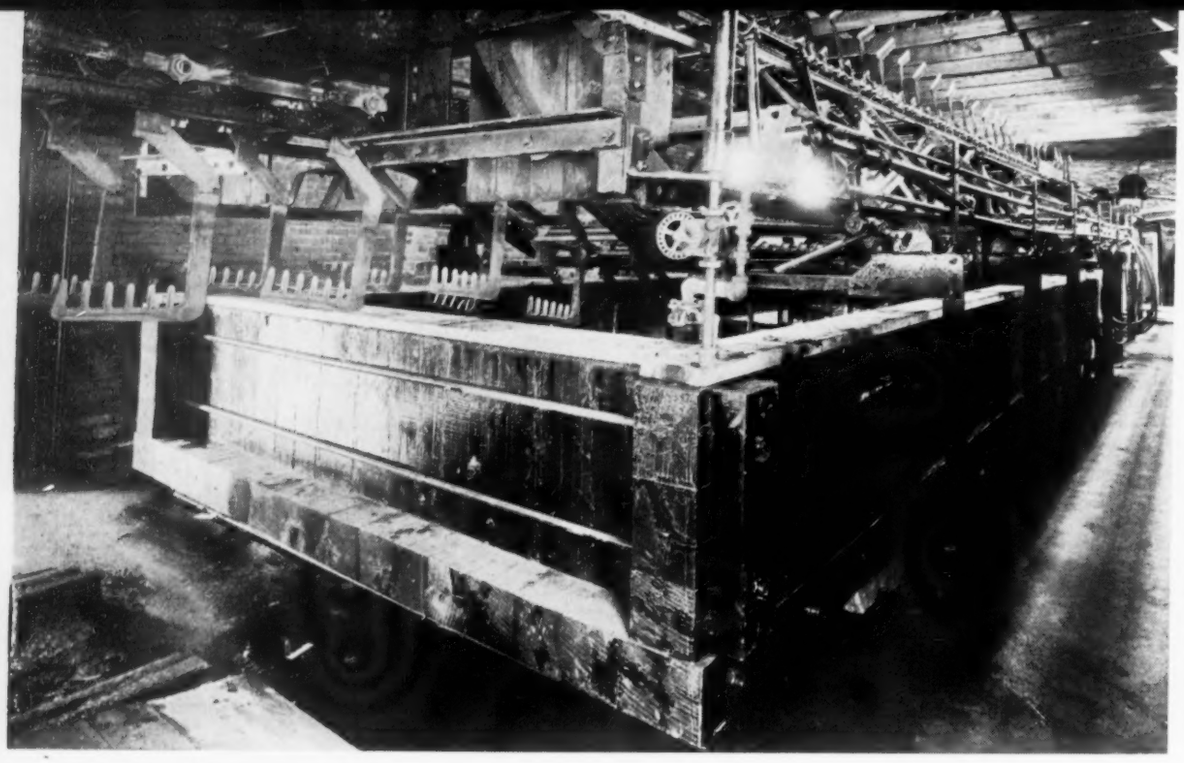


FIG. 1—Typical wooden pickling tank, showing end timbers placed on end to facilitate pulling up tightly

Wooden Pickling Tanks

Some Practical Considerations Involved in Their Design, Construction and Maintenance

BY PAUL W. BENNINGTON*

DESIGN and construction of wooden pickling tanks present a number of interesting engineering problems. The following discussion outlines some of the principles that must be adhered to by the practical tank builder.

Pickling solution for the average pickling operation is sulphuric acid at from 2 to 10 per cent concentration and at a temperature between 150 and 210 degrees Fahr.; and tanks for such service will be considered here.

Water, either hot or cold, will swell any wooden tank; but hot sulphuric acid, even at the low concentrations indicated above, has a dehydrating effect on the lumber, and it will shrink the wood with which it comes in contact.

Lumbers ordinarily chosen for pickling tank service are long leaf yellow pine, cypress, and douglas fir. The best of these is the dense, heavy, pitchy, close grained long leaf yellow pine (pinus palustris) grown on the east coast of Florida and in the low or "tidewater" region of the Gulf states. This type of pine is superior to the short leaf yellow pine from the hills of Arkansas or other similar high country.

For pickling tank service there is no objection to sound red knots; in fact, since they are saturated with pitch they will outlast the surrounding lumber. On the other hand, the tank builder must reject black knots or red knots with a black ring around them since thsee are commonly due to a dead limb and will "pipe" or leak easily, and in extreme cases will fall out.

Lumber from trees which have been tapped for turpentine does not contain as much pitch as untapped trees, and it is this pitch which lends unusual life to long leaf yellow pine. At this point attention should be called to an important fact often overloked: There is a decided difference between pitch and sap, or between heartwood and sapwood. Pitch is a heavy, sticky, resinous substance found in the heartwood of the pine, and its presence increases remarkably the resistance of the lumber to corrosives. Sap is a watery substance found in the outer or sapwood region of the tree, and this portion of the timber is rejected for pickling tanks because it is eaten away rapidly by the acid. Also it is not as strong as the heartwood, and it warps more easily.

Timbers which show shakes also must be rejected. This major defect, inherited from the growing tree, is not to be confused with checks or shrinkage cracks which occur in the cut timbers. The latter are almost impossible to avoid, particularly in summer months; if they are small, however, they do not impair the value of the timbers for pickling tanks. Tank men prefer seasoned timbers for pickling tanks since they shrink less in service than green timbers. At the present time this is almost impossible on larger sized timbers because lumber companies everywhere have allowed stocks to become depleted over the depression.

Mr. Bennington, who has prepared this article at the request of the editors of STEEL, is superintendent of Cleveland Tank & Vat Co., Cleveland.

In most cases, then, this means mill delivery and freshly cut timbers.

Fig. 2, taken from bulletin No. 1136 of the department of agriculture, shows typical shrinkage of a cross section of timber. Bulletin No. 158 gives the relative magnitude of this effect for long leaf yellow pine: 5.3 units for radial shrinkage as against 7.5 for tangential shrinkage. Shrinkage lengthwise of the grain is not given in these tables as it is negligible, being on the order of 0.2 to 0.3 on the above comparative scale. A good tank builder should consider carefully these relative shrinkages in turning and placing the timbers in a tank.

As mentioned before, cypress and douglas fir are likewise used for pickling tanks though, in the opinion of this writer, they are not as satisfactory as the pine. Chemically they are inferior to pitchy pine, and mechanically they are weaker. The latter factor is of real importance in a pickling tank which must hold a heavy load and withstand abuse due to bumping, etc. Bulletin No. 158, previously mentioned, indicates these relative strength factors:

	Comparative figure on bending strength	Comparative hardness
Cypress	53	35
Douglas fir	79	52
Long leaf yellow pine	106	76

These figures indicate that long leaf yellow pine will make a more rigid tank than cypress or douglas fir, and the hardness indicates that the resistance to crushing-in of the washers is greater.

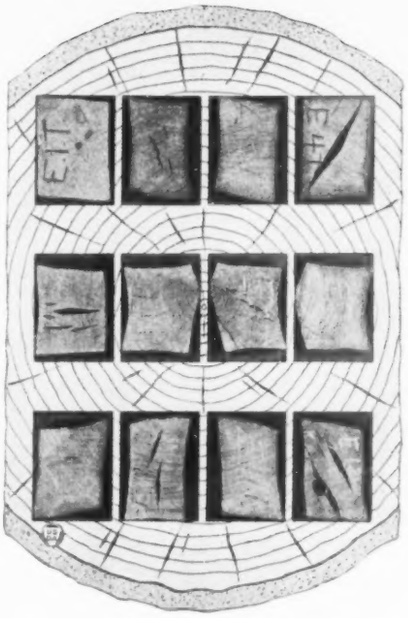


FIG. 2—Shrinkage of cross section of timber, from bulletin 1136 of the department of agriculture. The various sections are placed in their correct positions with respect to the cross section of the tree from which they were cut

For water, sloshing or feed tanks, however, both cypress and fir, as well as redwood and some other lumbers, are used, but these are primarily water tanks in which corrosion is minimized and shrinkage is not a factor.

Fig. 3 shows details of construction of a pickling tank for use in average type work, such as pickling stove parts prior to enameling. Since this tank is a shrinking tank, slip tongues are not used; as previously shown, lumber shrinks differently in different directions across the grain so that it is unwise to insert slip tongues in between timbers in this shrinking type construction.

May Give Rise to Leaks

Slip tongues are sure to be of a different grain structure than the adjoining timbers at some or all points in their length. If the timber is 5½ inches in thickness and there is one slip tongue ½-inch wide in the joint, then if the slip tongue shrinks more than the timber the effective butt joint width is cut down to 5 inches—which size timber might as well have been taken in the first place as far as joint area is concerned. In addition, any small leak that starts will be piped out at the end of the timber and it will be difficult to locate the source of trouble on a long tank. If, on the other hand, the slip tongue shrinks less than the tank timbers, then the tendency is for the slip tongues to

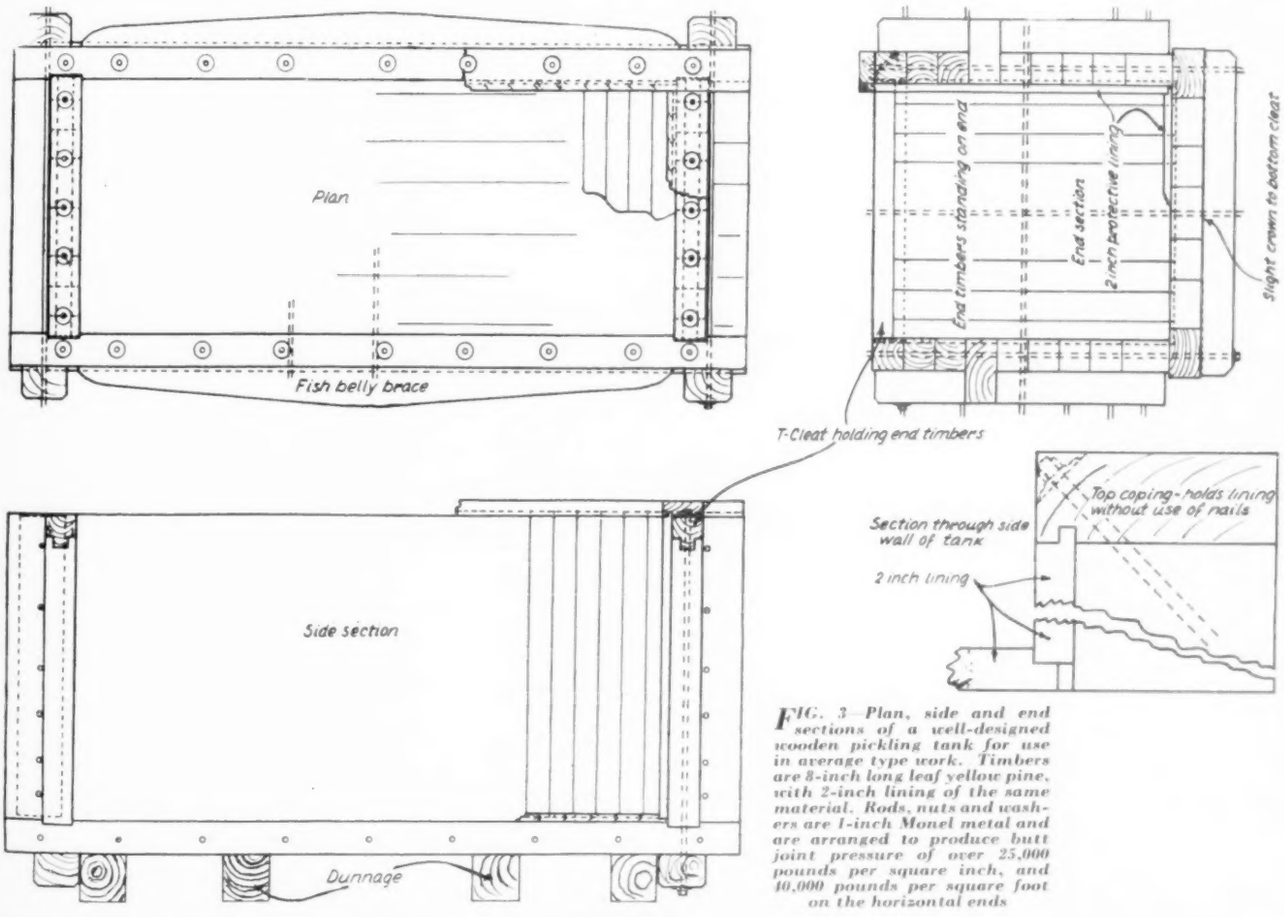


FIG. 3—Plan, side and end sections of a well-designed wooden pickling tank for use in average type work. Timbers are 8-inch long leaf yellow pine, with 2-inch lining of the same material. Rods, nuts and washers are 1-inch Monel metal and are arranged to produce butt joint pressure of over 25,000 pounds per square inch, and 40,000 pounds per square foot on the horizontal ends

hold the timbers apart so that they cannot be pulled up tight. When this happens the entire compressive stress of the butts is concentrated on the slip tongue—obviously unsatisfactory. The best practice today on wooden acid tanks is to use bare compression joints with no slip tongues, white lead or any other sealing compound in the joints, the latter being kept tight by pressure alone.

The tank in Fig. 3 has a 2-inch long leaf yellow pine lining held firmly in place only by coping on the upper edges of the tank. This tank is braced laterally by a fish belly brace, which adds considerably to the rigidity of the tank. Since this tank was designed for hot sulphuric acid, it must be capable of being drawn up tightly as it shrinks. This is facilitated by placing the end timbers vertically so that they do not cross grain with the bottom timbers. This type of construction will be described in more detail later in this discussion.

Empirical formulas have been used to ascertain the minimum acceptable joint pressure on wooden pickling tanks, as follows:

Type of joint	Minimum acceptable pressure, lbs./sq. ft.
Parallel timbers	25,000
Crossed timbers	30,000
End grain butted up against timber	40,000
End to end	Unsatisfactory

Tie bolts or rods should be sufficient in number and of such area at the root of the thread so that with the given elastic limit of the metal, the pressure produced will be greater than the minimum given above. Table I gives the theoretical number of bolts required for all sizes of tanks for the parallel timber or 25,000 pounds per square foot range, and using a bolt of 50,000 pounds per square inch tensile strength and USS threads. For the other types of joints, the number of bolts must be increased correspondingly.

The same spacing using larger bolts would produce the increased pressure desired, but as will be shown later, each timber thickness has a standard size bolt and washer which it is best to use for that timber. In some cases the next larger sized washer is wider than the timber. In using this table it is well to remember that the rods do not necessarily have to be spaced evenly along the length of the timber; they should in fact be spaced slightly closer together at the corners, for that is where leaks are most likely.

Materials for Tie Rods

Rods, nuts and washers for pickling tank tie rods must be of some acid-resisting metal. Hot-rolled rods usually are used, and the several aluminum bronzes or Monel metal generally are favored. Chief factors to be considered for tie rods are corrosion resistance, mechanical strength and cost. Some of the acid-resisting bronzes are subject to dealuminification or plating out of one of their constituents. This leaves, as the action progresses, a compact shell of low tensile strength material around a constantly diminishing core of bronze. Ultimately such a rod will fail in tension, or the threads will shear off. Fig. 4 shows an advanced condition of this type of corrosion.

As is well known, two different metals in an electrolyte produce a galvanic cell, and some of the corrosion in tie rods is due to this action between the metal being pickled and the tie rod. In a tight tank this is practically eliminated, however, and corrosion is more likely to start at the rod ends, due to another type of action. The construction of wood tanks requires tie rods to be placed in holes drilled in the wood. If there should be slight acid seepage into these holes, or if there is splashing

Table I

Rods Required in Wooden Tanks

Theoretical Number of Rods Required to Produce a Butt Joint Pressure of 25,000 Pounds per Square Foot (Either Open-Hearth Steel or Monel Metal)

Overall length of timber, feet	Rod diameter, inches: ½	⅝	¾	⅞	1	1⅛	1¼
	Width of timber, inches: 1⅝	2⅝	3⅝	5⅝	7⅝	9⅝	11⅝
1	.....	.....	.....	.....	.....	.....	.....
2	.....	.....	.....	.....	.....	.....	.....
3	1.6	1.6	1.6	1.7	.....	.....	.....
4	2.1	2.1	2.1	2.2	.....	.....	.....
5	2.7	2.7	2.6	2.8	.....	.....	.....
6	3.2	3.3	3.2	3.4	3.5	3.5	3.3
7	3.7	3.8	3.7	3.9	4.0	4.0	3.9
8	4.3	4.3	4.2	4.6	4.6	4.6	4.4
9	4.8	4.9	4.8	5.0	5.2	5.2	4.9
10	5.4	5.4	5.3	5.6	5.8	5.8	5.5
11	5.9	6.0	5.8	6.2	6.3	6.3	6.1
12	6.4	6.5	6.3	6.7	6.9	6.9	6.6
13	7.0	7.0	6.9	7.3	7.5	7.5	7.2
14	7.5	7.6	7.4	7.8	8.1	8.1	7.7
15	8.0	8.1	7.9	8.4	8.7	8.7	8.2
16	8.6	8.7	8.4	8.9	9.2	9.3	8.8
17	9.1	9.2	9.0	9.5	9.8	9.8	9.4
18	9.7	9.8	9.5	10.1	10.4	10.4	9.9
19	10.2	10.3	10.0	10.6	10.9	11.0	10.5
20	10.7	10.8	10.5	11.9	11.5	11.6	11.0
21	11.3	11.4	11.1	11.8	12.1	12.2	11.6
22	11.8	11.9	11.6	12.3	12.7	12.7	12.1
23	12.3	12.5	12.1	12.9	13.2	13.3	12.7
24	12.8	13.0	12.6	13.4	13.8	13.9	13.2
25	13.4	13.5	13.2	14.0	14.4	14.5	13.8
26	13.9	14.1	13.7	14.5	15.0	15.0	14.3
27	14.5	14.6	14.2	15.1	15.6	15.6	14.8
28	15.0	15.2	14.8	15.7	16.2	16.2	15.4
29	15.6	15.7	15.3	16.2	16.7	16.8	16.0
30	16.1	16.3	15.8	16.8	17.3	17.4	16.5
31	16.6	16.8	16.3	17.3	17.9	17.9	17.1
32	17.2	17.3	16.8	17.9	18.5	18.5	17.6
33	17.7	17.9	17.4	18.5	19.0	19.1	18.2
34	18.2	18.4	17.9	19.0	19.6	19.7	18.7
35	18.8	19.0	18.4	19.6	20.2	20.2	19.8
36	19.4	19.5	19.0	20.2	20.8	20.8	19.8
37	19.8	20.0	19.5	20.7	21.3	21.4	20.4
38	20.4	20.6	20.0	21.3	21.9	22.0	21.0
39	20.9	21.1	20.6	21.8	22.5	22.6	21.5
40	21.4	21.6	21.0	22.4	23.1	23.2	22.1

Formula used for developing these values:

$$N = \frac{L\ W\ P}{S\ A}$$

Where:

N = Theoretical number of rods required.
L = Length of timber, in feet.
W = Width of timber, in feet.
P = Pressure desired, in pounds per square foot.
S = Elastic limit of metal, in pounds per square inch.
A = Area at root of bolt thread, in square inches.

over of or excessive fumes from the acid contents of the tank, there is likely to develop a condition which will produce a concentration cell. Any one metal in two different electrolytes, or in different concentrations of the same electrolyte, will produce a concentration cell. Since nickel or copper are usually the chief constituents of tie rods it is important to know that electrolytes of different copper concentration or of different oxygen concentration are active in corrosion, whereas electrolytes of different nickel concentration are only slightly active in corrosion. Hence if any of these tie rods are slightly corroded so as to contaminate the pocket of electrolyte around them with their salts we have a further corrosion due to the concentration cell effect of the salt so produced.

This means briefly that alloys high in copper are more likely to be corroded due to concentration cell action than those alloys high in nickel. This type of corrosion is chiefly responsible for the disintegration of the threaded ends with all types of rods, for it is in the crevices around the threads that solutions of varying concentrations are pocketed.

Table II

Metals Used in Acid-Resisting Equipment

	Ultimate strength, lbs./sq. in.	Elongation, per cent in 2 in.
Monel metal	70,000	45
Copper	32,000	38
Everdur	55,000	85
Aluminum bronze	60,000	60
Mild steel	64,000	35
Stainless steel	92,000	50
Duriron	10,000	Nil.
Cast iron	20,000	Nil.

Mechanical strength is important in tie rods, since it is the butt pressure between the timbers that keeps them from leaking. Table II shows the elastic limit of hot-rolled rods of several metals commonly used in sulphuric acid pickling tanks.

The Cleveland Tank & Vat Co. has for some time used a type of construction on pickling tanks which is unique, and which takes advantage of the physical characteristics of the wood. Since the lumber in a pickling tank shrinks in service, why not place all timbers — bottoms, sides, ends — in such a way that they do not cross grain with each other? This can be done if the end timbers are stood on end and the tops of them held by a cleat. Fig. 1 shows such a tank; and should it shrink 3 inches in width it can still be pulled up tight. This, of course, could not be done if the end timbers

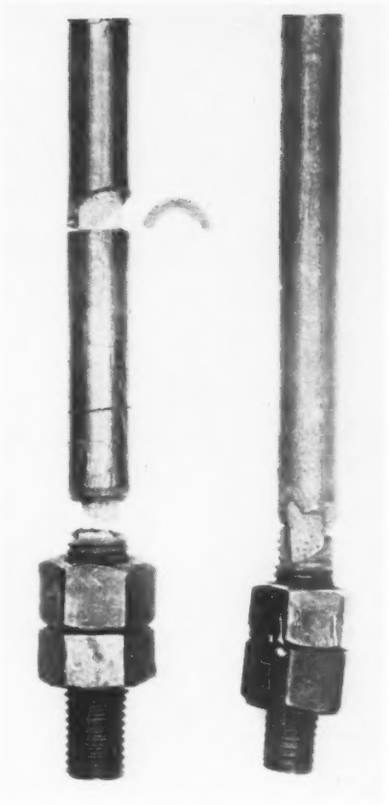


FIG. 4—Advanced specimens of cementation corrosion, caused by plating out of one of the constituents of the shell of these pickling tank rods

were laid down at right angles to the bottom timbers as is done in swelling or water tanks. The tops of these vertical end timbers are held by a cleat T-shaped in cross section, and the cleat can be cut off to fit the reduced widths of the tank as it is progressively tightened.

In the best type of rectangular tank construction the ends are mortised or gained into the sides and bottom. In the opinion of the writer this can best be done as illustrated in Fig. 5. The end or male piece is square except that the sharp corner is chamfered off. The female members (bottom and sides) have a mortised or routed slot, the wall of which is tapered in at an angle of about 5 degrees so that as the end is pulled into the mortised slot in the construction of the tank it will undergo considerable compression. This makes a tight joint.

The ideal growth ring structure for the end or male piece is shown at *A* in Fig. 5. If, in placing the timber, the builder had turned the rings on this piece as shown at *B*, then it would be hard to make a clean, tight joint because the grain would tend to shell or splinter off as shown.

Features of Well-Built Tank

Numerous other items may be mentioned as indicative of a well built tank. These should include:

Densest and strongest timbers placed on the edges of the tank where the washers bear, to minimize crushing-in of the washers.

Wide chimes on the bottom at the sides. This minimizes the tendency of the compressed bottom timbers near the washers to swell out and raise the sides right over a horizontal bottom bolt. This would result in a low spot — a leaker — between the bolts.

Make the side and bottom bolts as near to each other as possible. If they are staggered alternately along a tank the tendency is to pull or twist the tank out of square.

Wherever possible, it is best not to countersink any nuts and washers but to place them on the face of the timber and cover them with counterbored coping secured by dowels.

Long tanks, exceeding 3 feet in depth, should have the sides reinforced against bowing in. This can be accomplished by making one of the side timbers into a brace or fish belly girder as shown in Fig. 3. This makes the tank much more rigid and is inexpensive. Similarly, a truss rod from end to end resting on a wide cleat at the center of the tank and provided with turnbuckles will brace a long tank against bowing.

On wide tanks it is well to have the horizontal bottom cleats under the ends with a slight upward arch. If all vertical end rods are pulled up evenly this crown makes a greater pressure in the center and tends to keep the bottom and ends tightly together all the way across.

In conclusion, emphasis should be given to proper care for tanks. Ade-

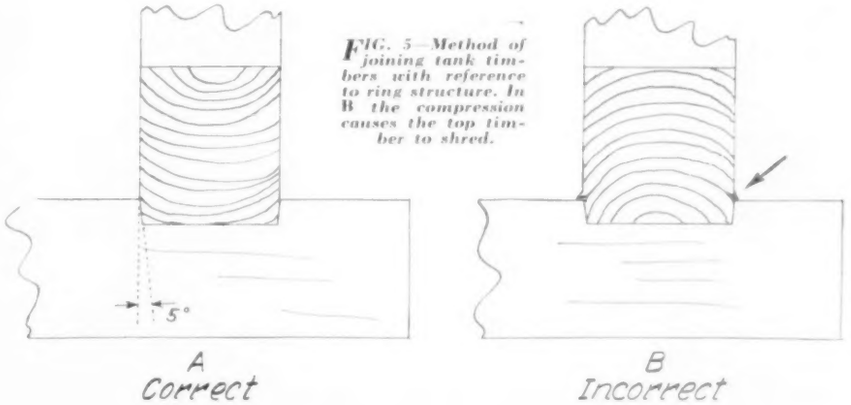


FIG. 5—Method of joining tank timbers with reference to ring structure. In B the compression causes the top timber to shred.

quate dunnage is essential to support the tank and its load properly. Most important is the necessity of frequently tightening a new tank at regular intervals, whether it leaks or not. No one nut should be taken up more than about a quarter turn at a time; thus, for instance, all bolts in one panel are pulled up together. This keeps the tank from pulling out of shape, and it prevents crushing the washers into the wood which is what would happen to each washer in succession if it were tightened the full amount all at once.

Composite Steel for Automobile Body Dies

BY M. K. MELLOTT

ACUMEN of the automotive industry in merchandising has resulted in radical changes annually in automobile body styles. Attendant demands placed upon automobile body builders, consequently faced with heavy costs of buying new dies each year, has led to extensive development in the making of composite die steel.

Following tests extended over the past two years, Jessop Steel Co., Washington, Pa., a pioneer in the field of special composite steels, has developed and has been marketing recently more than 15 different types of composite steels for as many applications. The company is now producing composite die sections which are finding wide application for automobile body dies.

One obstacle encountered by the company in presenting this composite stock for diemaking was the bonding of the high-grade steel to the softer, less costly metal. This problem has been solved by means of complete enveloping, during the casting processes, the specially prepared insert with soft steel, and subsequently rolling at high temperatures, thus producing a perfect weld.

In making these composite die sections, the insert is cast to the desired shape, and sandblasted. The cleaned insert then is placed in a mold where molten low-carbon steel is poured around the insert. This ingot is then stripped, charged in soaking pits and bloomed. The bloom is rolled at approximately 2150 degrees Fahr. It is then cut, ground and rolled to the desired shape and size. During the blooming operation, the tool steel is completely enveloped, retaining its form and analysis, and the soft metal is not ground off until after the blooming is finished.

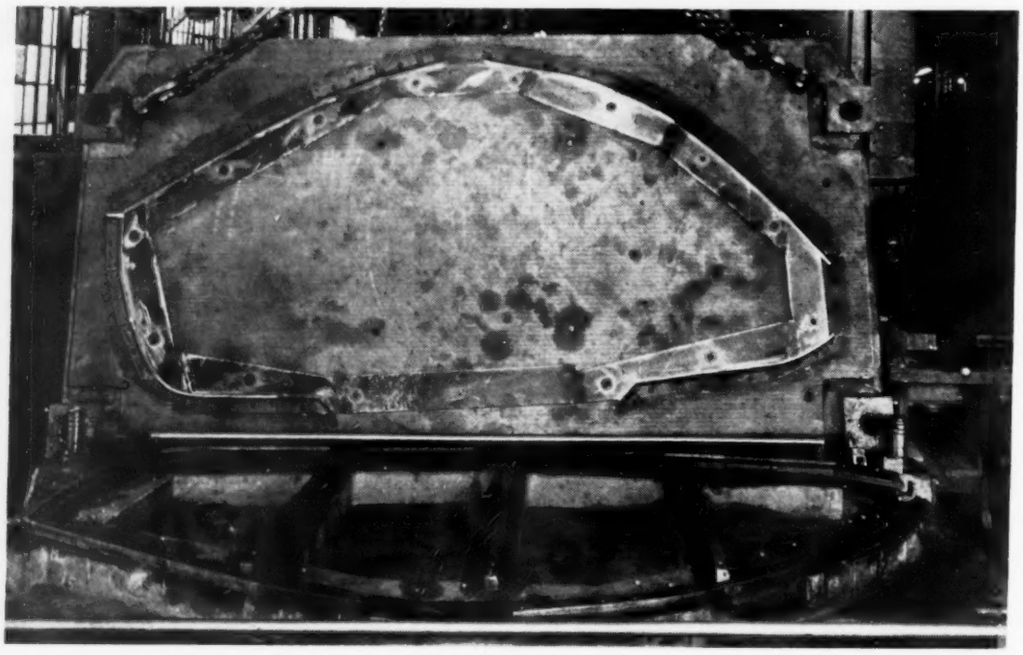
Treatment Improves Bond

Uniformity of structure is obtained in bonding the tool steel and the backing material through special heat treatment. The company has found that a quench in salt brine solution from 1425 degrees Fahr. to 1450 degrees Fahr. and a draw at 375 degrees Fahr., or a quench in water from 1450 degrees Fahr. to 1475 degrees Fahr. and a draw at 380 degrees Fahr., remaining in the quench in each case one hour for each inch of thickness, produces the maximum desired properties in both steels. The relationship of the coefficients of expansion between the soft metal and the tool steel insert is so aligned by analysis control that it is believed to be closer than the average welded article. An accompanying photomicrograph illustrates the interlocking crystalline structure along the weld.

Reduced cost of dies through the use of this composite steel is a major consideration that has led to wide application. Since the larger percentage of the die section is soft, inexpensive steel and only the exposed surfaces are of the higher cost tool steel, the original, as well as the ultimate, cost of the dies is reduced substantially.

Ordinary tool steel for dies usually is sold in rectangular bars, which have to be machined, with a loss of approximately 35 per cent of the original material purchased. Moreover, ordinary tool steel must be drilled for dowel holes before hardening, and after hardening often draws back from the cutting edge of the tool for more drilling. This loss of steel and time is eliminated through the use of composite steels, which can be rolled to the various shapes, ready for use, with only a small percentage (about 2 to 3 per cent) to be machined off the bars.

The composite die steel also can



BLANKING die for the side panel of a sedan model, used in a large automobile plant, and built up of composite die sections

be hardened and holes can be drilled after hardening at any desired point without fear of warpage or inaccuracy of the hole position as a result of heat treatment. In the event some warpage occurs during the hardening, the composite die section steel can be straightened out readily because of the ductility of the softer material.

Other advantageous cost factors include the ease of machining and finishing of the softer material in the composite die sections. Savings of at least 18 and as high as 38 per cent have been reported to date in machining and original purchase weight. Such savings have been made possible, according to Jessop, by virtue of the range of rough sizes produced by the company which can be finished to sizes that are rapidly becoming standard among many die shops.

Production of Jessop die sections in lengths up to 14 feet and longer, if required, increases efficiency in automatic machining setup time. The sections are produced also in ring form, S-shape, 90-degree bends and other forms.

Photomicrograph showing the interlocking crystalline structure along the weld in the composite steel

Perfects Advantageous New Skid-Load Method of Shipping Strip Steel

MANY consumers of strip steel now are unloading their steel coil shipments at one-third to one-fifth the former cost as a result of receiving the steel strapped to light, low, nonreturnable wooden skids. This method of shipping strip recently was inaugurated by the Acme Steel Co., Chicago. Formerly, when a car of steel arrived at the customer's plant, it was necessary to load each coil by hand on a truck, transfer it to the incoming weigh scale, and then to the warehouse where each coil again was unloaded by hand. Ordinarily this job would take two men at least half a day. And later when the steel was to be used, each coil again was loaded on a truck by hand to be taken to the machine.

Time Saving Appreciable

Now, when a car, loaded by the new method, arrives, all that is necessary to get at the steel is to cut the bands that brace the load. This takes only four or five minutes. Either a power or a hand lift truck is run under a skid load of five or more coils which weigh 2000 to 3500 pounds, the size depending on the type of material and the customer's trucking equipment. The truck lifts it up, and carries it to the scale and then to the warehouse. Therefore, instead of the job taking two men half a day, one man with a power truck can unload a car of steel coils and stock them in the warehouse in half an hour — a clear saving which exceeds $3.50 a car in unloading time alone. Moreover, a similar saving in handling costs is made when the steel is taken out of the warehouse as the coils still are strapped on the original skids. Not a single coil is handled manually until the time it is taken off the skid beside the press or other machines at which the steel is to be used.

It is evident that almost complete mechanical handling eliminates practically all possible sources of damage to the steel as well as injury to workmen's toes and fingers.

Skids are made with 2 x 4's on edge for runners, and 1 x 4's crosswise for the platform. This construction makes a light, strong, economical skid, exceptionably stable in transit. As most sizes cost only 15 to 20 cents, it is unnecessary to return them and when a supply of skids accumulates many other uses are found for them around the plant, thus reducing handling costs. The skids may be handled easily with a power fork truck or a low-lift hand truck. The latter type was designed to slip under a load with only 3½ to 3¾ inches clearance so that 2 x 4-inch runners could be used. This truck is used widely to handle skid shipments of tin plate.

Skid loading has proved equally valuable on truck shipments. Not only can the steel be loaded and unloaded much quicker, but on the truck the skids bear against one another instead of on the sides of the coils, so that in many cases it has been possible to do away with burlapping.

Placing loads of strip in box car for shipment. Skids always are placed with runners lengthwise of car

A.S.T.M. Reports Corrosion Work

FOUR standing committeees of the American Society for Testing Materials have etxensive research programs under way involving corrosion and the 1935 reports of these groups give extensive data and information on the current results of the various projects. The reports cover corrosion of iron and steel, nonferrous metals and alloys, die-cast metals and alloys, and screen wire cloth.

The 31-page report of committee A-5

on corrosion of iron and steel gives three specifications covering electrodeposited coatings on steel. Detailed tabulations of failures observed in the Annapolis tests, begun in 1916, comparing copper-bearing with non-copper-bearing materials are given and also the total immersion tests at Portsmouth, N. H., and Key West, Fla. A major portion of the report details the work on field tests of metallic coatings.

Tables analyze corrosion tests of galvanized sheets and two full-page tables give current data on tests of coated hardware, structural shapes, tubular goods, etc., involving eight type pages of coatings applied in 1928 by commercial operations. Copies of this report are available at 50 cents each.

Complete Nonferrous Tests

The report of committee B-3, on corrosion of nonferrous metals and alloys, 35 pages, covers three extensive test programs—atmospheric corrosion, corrosion in liquids and galvanic and electrolytic corrosion. The section on atmospheric corrosion gives results on tests of 24 nonferrous metals and alloys and after an exposure of 3 years at nine locations. The extensive data—14 full-page tables—cover changes in weight, tension tests, visual inspection. The chapter on corrosion in liquids pertains to the work in sodium chloride, sodium hydroxide, hydrochloric acid and sulphuric acid.

Tables analyze the results of the various tests on some 20 nonferrous alloys and metals being investigated. The section on galvanic and electrolytic corrosion discusses the corrosion behavior of metals in contact with dissimilar metals on outdoor exposure. All couple combinations of seven metals are being studied. The current report details records after exposure of 3 years at the nine test sites. Copies of this report are available at 50 cents.

One of the society's most extensive research projects is sponsored by committee B-6 on die-cast metals and alloys. The 1935 report covers an investigation of certain aluminum die-casting alloys, but especially details the work on exposure and corrosion tests giving the results of the first 5 years of such tests on 12 aluminum and 10 zinc alloys exposed at six outdoor and four indoor locations.

The data, involving thousands of chemical and physical tests, are presented concisely in tabular form and the report is completed by a description of the photographic inspection of die-cast specimens exposed for 4 years at six outdoor locations. Copies of this 52-page report are available at 75 cents each.

Report of committee D-14 on screen wire cloth presents a summary of essential details and results of exposure tests of seven compositions of nonferrous screen wire cloth exposed at four locations over a period of 9 years. The locations represent different atmospheric conditions. The report covers materials and preparation of specimens and the results of the exposure tests. Copies of this 20-page report are available at 35 cents.

Copies of the various reports may be obtained by addressing the American Society for Testing Materials at 260 Broad street, Philadelphia.

Will Standardize Letter Symbols and Abbreviations

A new dictionary of letter symbols and abbreviaitons, the "language" of engineers and scientists, will be undertaken by a committee of the American Standards association. Rapid coinage of new words and terms, and the adoption of many foreign words and phrases in the various fields of engineering and the sciences, demand a new compilation of standard usage, according to the committee.

In spite of its great ramification, engineering and science is becoming more and more integrated and those working in one field find that lack of abbreviations, or confusion of their use, restricts and hampers their work.

The committee on symbols and abbreviations of the Standards association has been reorganized and will begin at once the intricate task of co-ordinating existing abbreviations and symbols, and rewriting the present standards into a comprehensive manual of letter symbols and abbreviations. The scope of the work reads: "Standardization of letter symbols and signs for equations and formulas, and abbreviations for use in publications."

In line with American Standards association procedure, the committee is anxious to see that every group which has a problem in respect to abbreviations and symbols in its own field, be represented on the committee. Any group which has published its own standard for symbols is urged to submit a copy for consideration by the committee.

Because of the difficulty involved in writing this universal simplified language for all phases of engineering, the committee is urging those interested to send comments on the standards which have already been approved and suggestions for useful new symbols and abbreviations which are not now included to Dr. J. Franklin Meyer, national bureau of standards, Washington, chairman of the committee.

• • •

"Surface Treatment and Finishing" Feature To Appear Regularly in STEEL

OF VITAL importance in the manufacture of a vast majority of products made from steel and allied metals and materials is the subject of surface treatment and finish.

The sale of the majority of such products—and the consequent degree of success enjoyed by the company or companies producing them—depends to a large extent on whether they are finished attractively and on whether the finish will prove durable in service.

As clearly shown by inquiries constantly being received by the editors of STEEL, *the subject of surface treatment and finish is an important problem with metalworking companies, many of which are not yet abreast of the tremendous progress which has been made in surface treatment and finishing in the past few years.*

In addition to its regular coverage of new developments, processes, equipment, methods and materials of interest to these engaged in surface treatment and finishing, STEEL *has arranged a new service intended to help readers to solve their finishing problems.*

This new department will discuss methods of preparing surfaces to take a finish, methods of rustproofing surfaces, the characteristics of different kinds of finishes, selection of a finish or finishes to meet certain specific requirements, determination of the required thickness of coating, short-cut methods of testing coating materials to assure conformity of results to expectations, methods of applying the various kinds of finishing materials and all other phases of the subject.

Watch for the initial appearance of "Surface Treatment and Finishing" in an early issue of STEEL, *and its regular appearance in each issue thereafter.*

THE EDITORS

METHODS AND MATERIALS

Try This Method To Remove Those Stubborn Stud Bolts

Difficulty frequently is encountered in removing "frozen" stud bolts and cap screws and many times the task is not accomplished without damage to the bolt or screw threads. This operation can be made comparatively simple, it is said, when undertaken by the procedure described in the November issue of *Oxy-Acetylene Tips*.

Select a nut, preferably one having a square head that screws on the stud easily and has the same threads as the stud. Then cut the nut in two. This can be done by means of the cutting blowpipe if the operator can do a skillful job, but for this particular purpose it is better to use a hacksaw. Line up the two halves with sufficient space between them so that they are slightly farther apart than in their original position.

On one side, across the cut, bronze weld a thin piece of sheet steel to form a strap, leaving the other end of the cut on the opposite side open. The accompanying illustration shows this plainly.

In use, the nut is simply screwed on the stud bolt. A crescent or pipe wrench is then placed on the open split end of the nut so that the jaws grip only the front portion of the split nut. When pressure is applied the wrench jaws tighten up and force the two halves of the nut together on the screw threads. The stud is then easily removed without damage to the threads.

More leverage can be obtained by building up the open ends of the nut to about twice the thickness of the welded side. Bronze rod or steel welding rod can be used for this.

Properly applied, this idea will save time, tempers and stud bolts.

\$ \$ \$

Columbium or Titanium Improves Chromium Steels

Results obtained from welding 4 to 7 per cent chromium steel with columbium-bearing welding rod led to experiments on the higher chromium steels containing from 12 to 30 per cent chromium, since those containing less than about 14 per cent chromium also have air hardening tendencies. The presence of columbium or titanium in these steels reduces this tendency, makes them more amenable to hot working and forming operations, improves their physical properties after welding and therefore widens their field of application.

The higher chromium steels of low carbon content are subject to a coarse grain structure. This is especially true of ingots and castings which are cast at excessively high temperatures or held at a high temperature for a long time. This condition may be corrected by the presence of high nitrogen in the steel, which refines the grain, and makes the steel more ductile, even after welding.

\$ \$ \$

How To Cut Risers from Chromium Steel Castings

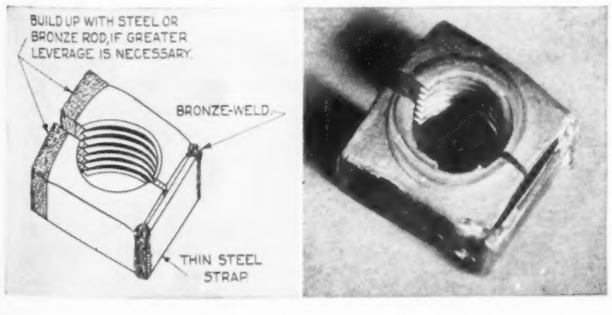
Foundrymen who make castings of 4 to 7 per cent chromium steel are sometimes confronted with a problem if they remove gates and risers from these castings by oxyacetylene cutting. To prevent air hardening and subsequent cracking, the usual procedure is to preheat the entire casting to a black heat—about 900 degrees Fahr.—at which temperature the steel is quite ductile. If the temperature of preheat becomes too high the entire casting may air harden. In other instances, the risers are sometimes cut from dead annealed castings. This, however, may develop hard spots in the vicinity of the cutting, and the casting must be re-annealed to insure uniform softness.

Columbium or titanium in the 4 to 7 per cent chromium steels is effective in overcoming the most of the difficulties of air hardening, resulting from cutting these steels with the oxyacetylene flame. The use of titanium, however, may introduce certain casting difficulties which it is believed can be eliminated by the use of columbium.

\$ \$ \$

Change in British Rail Design Increases Life

A change in design, which is expected to add 25 per cent to the life of steel rails used by British railways, has been adopted as standard by several of the most important British lines, including the London & North



Sketch and working model of the simple stud bolt remover

Eastern railway and the London, Midland and Scottish railway.

The change consists in adding 3/32-inch of metal to the head of the rail, and reducing the amount of metal in the foot of the rail by the same amount. The new design gives the head of the rail 3/16-inch additional metal on top as compared with 3/32-inch additional metal as provided by the old design. The weight of the bull head rail or old design was 95 pounds per yard and the new design will weigh about 100 pounds per yard.

Preventing Intergranular Corrosion in Welded 18-8 Chromium-Nickel Steels

THE welding problem encountered in the chromium-nickel austenitic steels, of which the 18 per cent chromium, 8 per cent nickel, may be taken as most typical, is due to the harmful effect of carbon, but in this case it is not that of air-hardening. The carbon in these steels acts to destroy their corrosion resistance by the formation of carbides along the grain boundaries and this promotes susceptibility to a type of corrosion commonly known as intergranular corrosion.

These carbides form when the steel is held for a time within a certain temperature range. The chromium-nickel steels, as purchased, have been heated above this range and quenched, and have a homogeneous, corrosion-resistant structure. However, when they are reheated to a temperature within the approximate range of 500 to 1400 degrees Fahr., a new constituent forms along grain boundaries. The formation of this constituent lowers the corrosion resistance of the metal at these points and opens the way for between-the-grain attack by corrosive media.

What Happens in Welding

During welding, the weld metal is heated to above the critical temperature and then cooled. There is insufficient time for precipitation of large quantities of the new constituent in the weld metal. However, the base metal in small zones close to a parallel to the weld metal remains heated within the critical range for a sufficient length of time and cools at a rate slow enough so that carbide precipitation takes place and these zones are subject to intergranular corrosion.

The weld metal itself, while relatively free from corrosion susceptibility, due to the welding heat, often suffers a decrease in corrosion resistance because of carbon pick-up from the welding flame.

This explanation of intergranular corrosion was contained in a paper on "Welding and Cutting High Chromium Steels" presented before the annual convention of the International Acetylene association in Cleveland, Nov. 12-15, by W. J. Priestley, vice president, Electro Metallurgical Co., New York. Outlining the means which are taken to overcome this corrosion, Mr. Priestley stated that presumably anything that would lock up the carbon in these chromium-nickel austenitic steels would improve their properties, and today a considerable tonnage of stainless steel, especially that designed for severe operating conditions, contains one or the other of the elements, columbium or titanium.

These elements serve as a stabilizer for the carbon in the steel and prevent the structural changes that otherwise take place when the steel is held for a time in the temperature range between 500 and 1400 degrees Fahr. The harmful effect of welding heat on the zones adjacent to the weld is therefore eliminated. This means that heat treatment after welding is unnecessary to obtain full corrosion resistance.

Since columbium is not lost from the weld metal during the welding operation, it is more satisfactory to use a welding rod containing columbium instead of titanium, regardless of what stabilizing element is used in the base metal. The presence of columbium does not complicate welding with the oxyacetylene flame and the free-flowing characteristics of the columbium-treated 18-8 rods makes them ideally suited for this practice. Columbium is especially beneficial since it counteracts the 0.02 to 0.04 per cent carbon which is picked up during welding.

Good Physicals Obtainable

Oxyacetylene welds made on columbium-bearing plate using columbium-bearing rod have good strength and ductility. The accompanying table gives an idea of the physical properties obtainable in oxyacetylene welds using columbium-bearing rod with columbium and titanium-bearing plate. The amount of columbium necessary in the steel varies from 6 to 10 times the carbon content of the steel.

The presence of columbium in the welding rod necessitates no changes in the welding procedure from that used on ordinary 18-8 stainless steel. The principle of a neutral flame and sufficient flux should be strictly followed. With columbium-treated plate and rod, backhand welding can be utilized to avoid the distortion that other methods of welding sometimes produce. With this technique, the weld metal and adjacent zones are held at a dull red temperature longer than by the usual forehand method. This need not be considered when columbium-bearing plates and rods are used, since the welding zone is amply protected.

Tensile and Bend Tests on Oxyacetylene Welds in 1/4-Inch 18-8 Chrome-Nickel Annealed Plate

All Samples Tested in As-Welded Condition

Cr.	Ni.	C.	Cb.	Ti.	Yield strength, pounds per square inch	Maximum strength, pounds per square inch	Elongation in 2 inches, per cent	Free bend test, 180 degrees
	Per cent							
*18.22	8.91	0.07	.....	.....	39,200	76,500	22	No cracks
†18.75	9.02	0.10	0.98	.....	37,200	75,400	20	No cracks
†17.42	8.88	0.07	.....	0.47	41,000	75,500	17	No cracks

*Welding rod same analysis as plate.
†Welding rod analysis: 18.34 Cr.; 9.01 Ni.; 0.07 C.; 0.81 per cent Cb.

Steel Plate Handbook Is Issued by Bethlehem

Steel Plates; 362 pages, 6½ x 9¼ inches, fabrikoid; published by Bethlehem Steel Co., Bethlehem, Pa.; supplied by STEEL, Cleveland, for $1, plus 15 cents for postage; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London.

This is a ready reference handbook for designers, fabricators, engineers and consumers of steel plates and flanged plate products. The subject matter is treated technically, though simply, from details of manufacture to various applications of these products.

The purpose is to provide in one complete volume all the necessary working data, including tables, specifications and general metallurgical and engineering information helpful to engineers and consumers.

Five divisions have been established

and all pertinent data for each has been correlated, making it unnecessary to refer to other sources for specific information. Part I deals with manufacture, specifications, tabulated data and applications; Part II with flanged and dished heads; Part III with tubes; Part IV, boiler design, riveted joints and welding; Part V includes engineering tables, including functions of numbers, natural trigonometric functions and similar tabulations.

Completes 10,000 Diesel Tractors in Four Years

Interesting figures on rapid growth of diesel engine production are supplied by the Caterpillar Tractor Co., Peoria, Ill., which on Nov. 13 celebrated completion of its 10,000th diesel tractor. The company announced its first diesel model Aug. 31, 1931. Since that time production has mounted as follows:

1000	Sept. 23, 1933
2000	Jan. 16, 1934
3000	April 4, 1934
4000	Aug. 1, 1934
5000	Nov. 5, 1934
6000	Feb. 4, 1935
7000	May 6, 1935
8000	July 11, 1935
9000	Sept. 16, 1935
10,000	Nov. 13, 1935

New Soil Pipe Standard Covers Wide Size Range

Nomenclature, materials, marking and inspection, and dimensions and weights, are covered in the new American standard for cast iron soil pipe and fittings, approved by the American Standards association, Oct. 8. The American Society of Mechanical Engineers and American Society of Sanitary Engineering assumed the responsibility for the work of the committee which developed the standard under the procedure of the Standards association.

To arrive at a series of dimensions and weights for soil pipe and fittings, the subcommittee of the sectional committee divided its task into four parts: (a) Soil pipe, sizes 2 to 6 inches; (b) soil pipe, sizes 8 to 15 inches; (c) soil pipe fittings, sizes 2 to 6 inches; and (d) soil pipe fittings, sizes 8 to 15 inches.

Specifications for pipe and fittings published in 1915 were used as a starting point, but these specifications covered only sizes 2 to 6 inches. The subcommittee added specifications for pipe in sizes 8 to 15 inches, in conformity with the standards for the smaller sizes. The committee also took into consideration the necessity of providing for the interchangeability of pipe and fittings made at present by the various manufacturers with that made to the new standard.

Much attention was given to simplification of the line of standard fittings. Fittings for sizes 2 to 6 inches include 39 separate and distinct items, and sizes from 8 to 15 inches include 19 items. The committee made an effort to reduce the number of fittings to a minimum consistent with the demands of the trade and yet maintain a sufficient variety of fittings to meet requirements most efficiently. Therefore, the committee eliminated 36 items that were being manufactured when it began work. The fittings eliminated are those now obsolete or inconsistent with sanitary practice.

Brooklyn High School Installs X-Ray Unit To Teach Industrial Radiology

WITH the installation of X-ray equipment in its new building, the Brooklyn Technical high school, Brooklyn, N. Y., is prepared to give its students instruction in industrial radiology. Aside from affording a means for making examinations rapidly and economically, the installation obviously had to be perfectly ray proof and electrically safe. All of these factors were considered carefully in designing the equipment.

The equipment was built by the St. John X-Ray Service Inc., Long Island City, N. Y., and was the first educational unit which it has designed. As shown in the accompanying illustration, it consists of a heavy lead-lined cabinet which encloses a standard 200,000-volt X-ray generator and air-cooled tube.

X-rays are permitted to escape from the cabinet only through a single window in the top. This opening is provided with a shutter, adjustable so that the area exposed to the rays can be varied from zero to the full size of the window. A specimen box fits over the top of the base cabinet. Two doors in front and movable panels on top permit access to the interior for arranging objects to be examined.

Safety devices are provided so that neither high voltage nor X-rays can be turned on while any access door or panel in either the base or the specimen box is open. A removable fluorsoscope of special construction for indirect viewing of the X-ray image can be employed for certain teaching purposes. The space around the equipment can be darkened for visual inspection. Another feature of the installation is a pinhole instrument for high-speed, high-voltage X-ray diffraction analysis of metals.

While this installation is to be used for training industrial X-ray technicians, it will serve as an important adjunct in teaching many subjects. It is installed in the heat treatment laboratory of the school. By means of diffraction patterns, the crystal structure of various metals can be checked before and after heat treatment.

In foundry practice, sand molds can be viewed under the fluoroscope

THIS 200,000-volt X-ray unit has been installed by the Brooklyn Technical high school to train industrial X-ray technicians. The equipment also will serve as an important adjunct in teaching many subjects

and the chaplets placed properly before the casting is made. This will enable the student to see whether the mold is correctly made before he pours the metal. After the casting is made, it can be X-rayed with the gate metal left in place. If porosity shows up within the casting, gates or air vents can be changed to overcome the defects.

Similarly, welded structures can be studied for defects. In this case, welding technique can be corrected by correlating defects with the method employed in making the weld. The X-ray installation is large enough to take care of the inspection of airplane fuselage structures.

At least 50 X-ray machines are in daily use in manufacturing plants in the country and with this method of inspection gaining recognition it is expected that the future will see a demand for skilled operators who can make proper use of the equipment and interpret results correctly. It is with this object in mind that the Brooklyn Technical high school is providing practical training in the industrial applications of the X-ray method of inspection.

Sets Up Department To Aid Plants in Ceramic Field

Formation of a new ceramic engineering service department has been announced by the Binks Mfg. Co., Chicago, to assist ceramic plants in modernizing finishing room layouts and to provide information on latest methods of effecting cost reduction and of obtaining quantity production.

The new department offers its facilities for suggestions not only on spray equipment, but also on all finishing room problems such as spray conveyor systems, overhead conveyor systems, ovens, brushing tables and dust collection equipment, automatic finishing equipment, water wash reclaiming spray booths, air conditioning of finishing rooms and all other materials, methods and equipment used in ceramic plants.

Steel Bridge Deck Weight 22 Pounds Per Square Foot

In an article, "Seattle Proves Practicality of Open Grid Decking for Bridges," presented on page 33 of the Nov. 18 issue of STEEL, it was stated that the open steel grid laid on Seattle's University bridge in 1933 weighed 2 pounds per square foot. This was a typographical error; the decking weighed 22 pounds per square inch. It was of the Irving V-special steel mesh type and was furnished by the Irving Iron Works Co., New York.

WELDING, et cetera . . .

BY ROBERT E. KINKEAD

IN THIS column, the author, well-known consulting engineer in welding, is given wide latitude in presenting his views. They do not necessarily coincide with those of the editors of STEEL.

Fundamental Principle

MILES C. SMITH in STEEL for Nov. 25 points out the advantage of boron overlays on steel for resistance to wear and corrosion. The significance of such cast or welded overlays is beginning to dawn on the metallurgists.

There have been certain limitations, in that heat treatment to obtain desirable physical properties in one locality has resulted in undesirable properties at some other area. Thus, a heavy piece of medium alloy might be quenched to get a hard surface but the stresses set up by the quenching were such that they could not be removed without destroying the hardness.

The difficulty, of course, arose from the fact that the metal on the surface, which it is desirable to have hard, is of such a composition as to make it necessary to quench to make it hard. To make the whole piece of metal having sufficient hardness to meet the surface requirements is to run the chance of extremely low impact resistance — to say nothing of the expense. The solution, in many cases, is an overlay which is hard without quenching.

It opens up a whole new field for the heat treaters to make it possible to have machinery and equipment parts made of two or more different kinds of metal. It fulfills the fundamental design principle which calls for a continuous metal structure with the metal in each area of such physical properties as to meet the service requirements.

* * *

It Can Be Done

Any man who can concentrate welding heat to a greater degree and control it to a finer precision than is possible with the electric arc can revolutionize welding methods in a most drastic way. This has actually been done in metals which are non-magnetic. The source of energy which is converted into heat has not been used heretofore for welding. Developments may be looked for in the application of this new source of energy to the welding of steel.

* * *

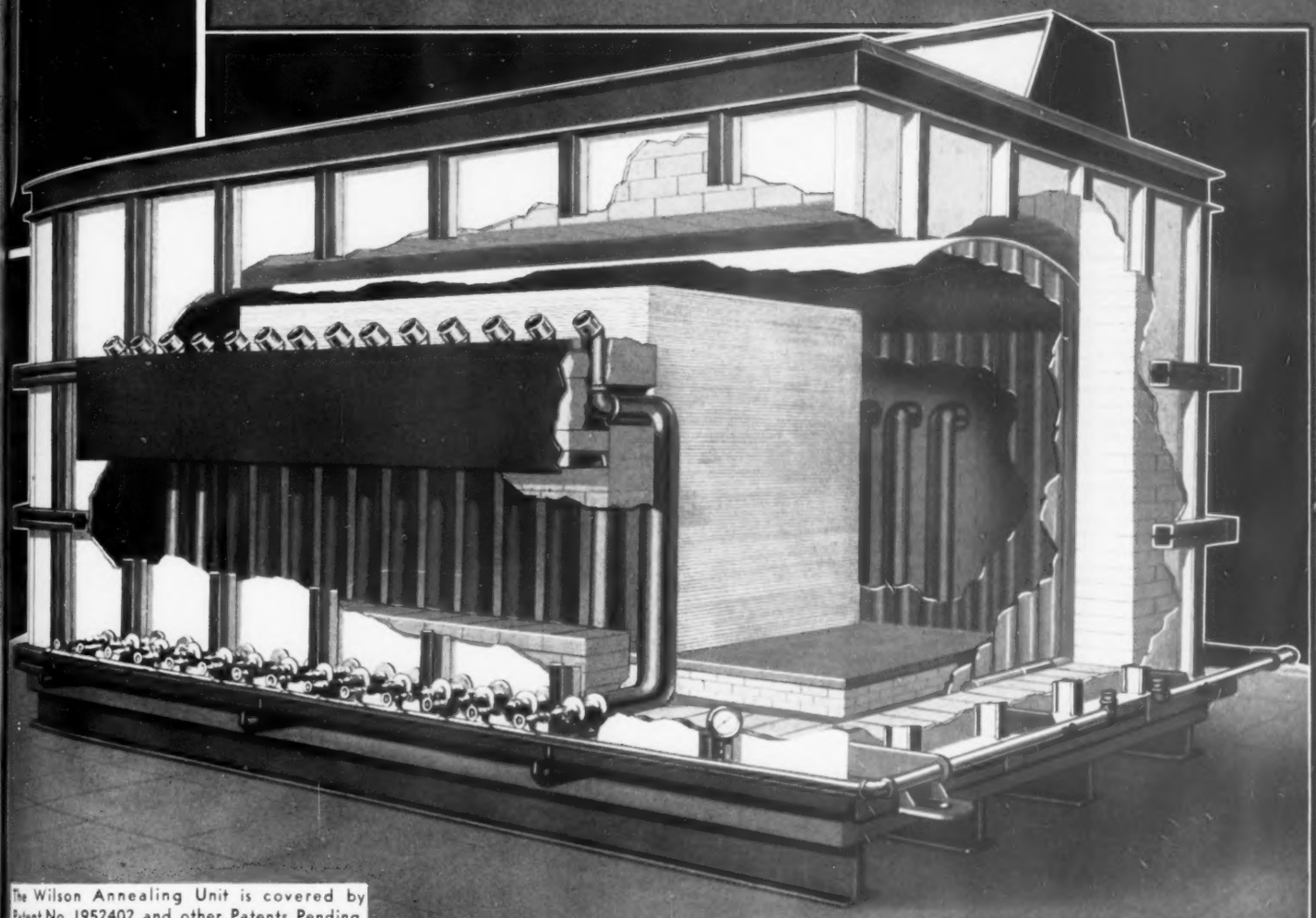
Handling the Job

Competition between the cast steel underframe for freight cars and an underframe made of an assembly of rolled steel shapes welded together represents industrial competition at its best. Almost unbelievable perfection of steel foundry practice has made the cast steel underframe thoroughly practical. Competition hinges on weight and cost. Cromansil, Cor-Ten and Yoloy steels (in the order of their presentation on the market) are bidding for recognition on the job.

Welding has been the neck of the bottle up to the present time for the steel producers who wish to get their high-tensile steel specified for underframes. Mechanical equipment to jig the job and handle it during welding costs more than car builders and railroads have been able or willing to spend. The net result is that welding costs are too high. It is not the welding itself that is expensive, but the unnecessary waste in handling makes the welding appear to cost too much. What will happen when a proper setup is made to weld the job remains to be seen.

With modern welding equipment and practice, handling the job during the fit-up and welding is of dominating importance in overall welding cost. Equipment for handling the job is a good investment because it results in greater productivity per man hour. (Orchids will be greatly appreciated from manufacturers of electric hoists, manipulators, position finders, monorail systems, gas and electric industrial tractors.)

SIMPLICITY
OF DESIGN AND CONSTRUCTION



The Wilson Annealing Unit is covered by Patent No. 1952402 and other Patents Pending.

The new Wilson Vertical Type Radiant Tube Annealing Covers have 6 different advantages:

1. Simplicity of design and construction.
2. Single tube control.
3. Vertical type radiant tubes.
4. Perfect heat gradient from top to bottom.
5. Perfect control of the heating length of the cover to the length of the charge.
6. Effects a 20% saving in annealing time.

The cut-a-way view of the cover above shows the simplicity of design and construction.

The WEAN ENGINEERING CO. INC.
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The Wilson Annealing Units sold by us are an exclusive development of
LEE WILSON ENGINEERING COMPANY • CLEVELAND, OHIO

POWER DRIVES

Price or Service

There is at least one right drive for every type of service and the most important part of selecting this drive is seeing that it is properly engineered to the particular service and operating conditions. Instuctions in transmission equipment catalogs generally indicate the recommended engineering for ordinary loading and service. Failure to appreciate unusual conditions and provide for them is responsible for the installation and continuance of most troublesome drives.

Plant engineers with only a few such drives may not have had sufficiently broad experience with the problems connected with engineering the different types of drive equipment to select the most satisfactory type and apply it to meet specific, special requirements. Cut and try experimentation is expensive under such conditions and is unnecessary because only occasionally does an entirely original drive problem arise which has not been solved somewhere else.

Calls for Outside Help

One progressive master mechanic in a plant operating about 150 machines profits from the experience of others in a rather unusual manner. When a troublesome drive problem arises, usually from an attempt to increase the speed and capacity of an old type machine, he puts the problem up to the manufacturers' representatives of at least three types of drives. One of these men handles all types of flat belts and has had wide experience with short-center drives. Another specializes on V-belts. The third is a chain drive representative. Sometimes speed reducer and variable speed equipment representatives are included.

Each man is given all machine motor data or other information available and permitted to study the drive in operation. Each is asked to make recommendations on which he will stake his personal reputation as well as that of his company and equipment. The master mechanic lets each man know that he is competing with the others with assured satisfaction as primary consideration and price as secondary. The man who is most convincing on assured satisfactory operation gets the order. So far each representative has offered to guarantee his drive because he knows that it will receive proper maintenance and servicing after installation, and none has failed.

If more drives were purchased on a service assurance basis than on price, power drives would not become problems in so many instances.

♦ ♦ ♦

Close Quarters

Many headaches in motor and drive maintenance could be prevented by a little planning ahead when installing the machine. For example, one concern recently installed three large presses on which the motors and flywheels are only a few inches from the sloping roof.

Now the plant engineer is worrying over how he can get the motor out without moving the press or opening the roof in case it should be necessary to remove the motor for emergency repairs. The press is driven by multiple V-belts with the flywheel grooved for the sheave. Some years hence he will be faced with the problem of lifting the flywheel and shaft out of the bearings sufficiently to slip new belts over the end.

He now is hoping that something will turn up so that the presses will be moved by that time. Setting machines of this size is expensive, however, so that they seldom are moved except in cases of extreme necessity.

♦ ♦ ♦

Loafing Drives

When drives balk and refuse to deliver they demand immediate attention. Thousands of drives, however, loaf on the job. Sometimes they loaf year after year without discovery for the reason that no one checks up and finds out how much they are shirking.

Often it is not the supervisory staff, which should be most interested, that tracks down loafing drives.

Many times the operator is blamed because he does not produce according to the schedule set for him or because he does not equal the performance of other operators on similar work. Most good foremen are adept at detecting loafing operators but frequently not so efficient at picking out poor drives. Where the drive is at fault piece-workers are often the first to complain and usually do when they learn that another workman is earning more than they do.

When such complaints are made they should not be dismissed as an alibi, because the machine, the tool or the drive may be at fault. In many cases the drive merely needs servicing to bring the operator up to production. Frequently a new drive will actually increase his production to the profit of the management as well as of the operator.

When production falls down for no apparent reason check up on the drive, perhaps it, rather than the operator, is loafing.

♦ ♦ ♦

Over Lubrication

The results of placing lubrication in the hands of untrained men was clearly demonstrated in a middlewestern plant engaged in the manufacture of a special machine where lubrication had been left to the machine operator. The antifriction spindle bearings on a double-headed polisher began to run hot daily before the end of the shift. The operator naturally thought that the bearings needed lubrication and applied his pressure gun to both bearings. Trouble increased as the bearings began to run hot earlier in the day. Finally the polisher was taken down for overhauling as it was believed that something had happened to the bearings.

When opened the bearings and the hollow casting surrounding the spindle were found to be packed tight with grease. As the polisher operated, the antifriction bearings churned through the solid grease, which expanded as it heated. When the bearing was full more grease simply made the condition worse.

The bearing was repacked with grease and put back in service. To prevent recurrence of the trouble the grease gun was taken away from the operator and placed in the hands of the maintenance department which now services the bearings on definite schedules.

Machine operators who always have been taught to "give her plenty of oil" find it hard to believe that a bearing can run a year without attention.

♦ ♦ ♦

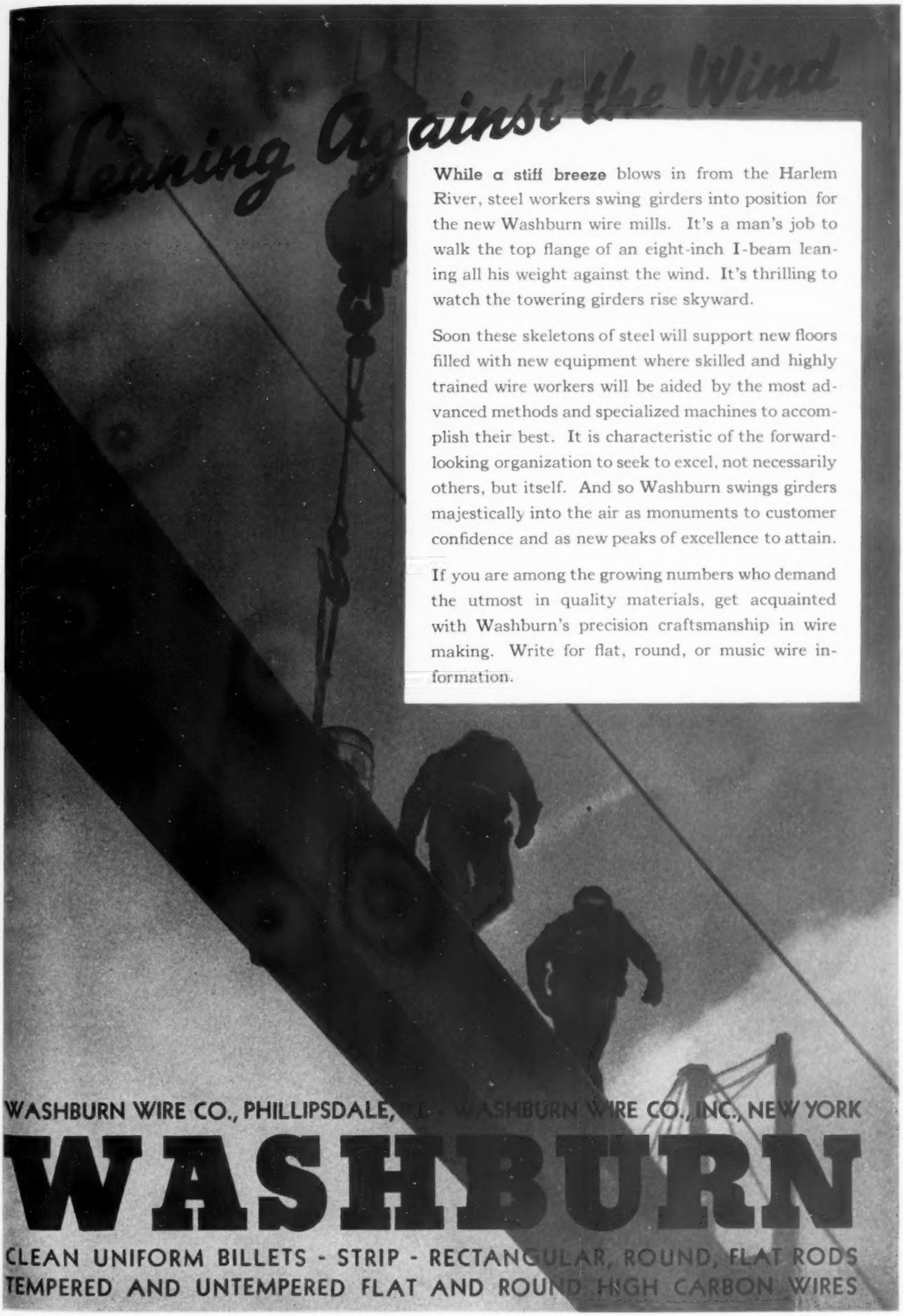
Failure to square the ends of a flat belt and the improper application of lacings or metallic fasteners are responsible for about one-third of the cost of belt maintenance.

♦ ♦ ♦

When a drive stops, production stops. When a drive lags, production is lost.

♦ ♦ ♦

Power is made, or bought, to be used usefully, not to be wasted.


Leaning Against the Wind
While a stiff breeze blows in from the Harlem River, steel workers swing girders into position for the new Washburn wire mills. It's a man's job to walk the top flange of an eight-inch I-beam leaning all his weight against the wind. It's thrilling to watch the towering girders rise skyward.
Soon these skeletons of steel will support new floors filled with new equipment where skilled and highly trained wire workers will be aided by the most advanced methods and specialized machines to accomplish their best. It is characteristic of the forward-looking organization to seek to excel, not necessarily others, but itself. And so Washburn swings girders majestically into the air as monuments to customer confidence and as new peaks of excellence to attain.
If you are among the growing numbers who demand the utmost in quality materials, get acquainted with Washburn's precision craftsmanship in wire making. Write for flat, round, or music wire information.
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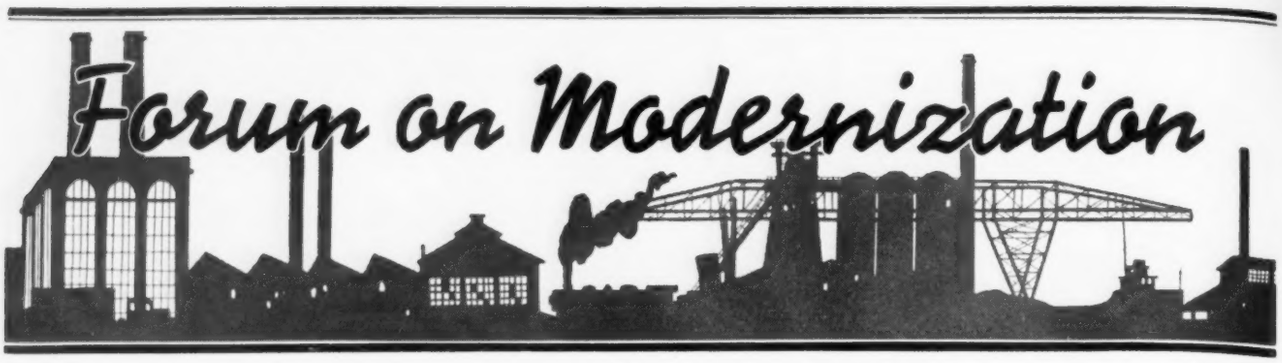

Modernization Wins Battle Against 23-Year Receding Price Trend

BY MAURICE STANLEY
President, Fafnir Bearing Co.,
New Britain, Conn.

DURING the entire 23-year period of its existence, the writer's company has had to operate against a declining price trend. There have been ups and downs in the price curve during this time, to be sure, but as a whole it's constant tendency has been downward. Even during the boom years, culminating in 1929 when everything was high, the price of ball bearings was lower than it was in 1912—when commodities were comparatively low in price.

Back to Bicycle Days

This is an unusual situation. When the economic cycle is in ascendancy, most businesses have the benefit of a rising price scale. During such times it is vastly easier to run a manufacturing enterprise at a profit. In fact there is a school of management that claims a business cannot show a profit when prices are falling and a company's investment in plants, equipment and inventory is steadily depreciating in value.

Our experience has proved that it is possible to operate a business profitably against a price trend. In fact we had to, or be forced to retire from the field.

Why this peculiar condition should hold is easy to understand when one is acquainted with the history of the antifriction bearings industry. While bearings of some crude sort probably originated in ancient times, the ball bearing business owes its commercial existence to the so-called "safety" bicycle. In the latter years of the nineteenth century there were at least seven companies in this country supplying ball bearings for 150 bicycle manufacturers.

The rise of the automobile called a halt to the bicycle boom. But, of course, the automobile offered a vastly larger market for antifriction bearings than had ever been dreamed of by the wildest enthusiast up to that time. It was to cater to this rapidly growing market for bearings that our company was started in 1912.

At first our principal, and I might say practically our only market, was the automotive industry. Gradually, however, we began to develop other fields for our product. Today antifriction bearings are used in actually hundreds of ways. As a consequence the number of markets has increased to such an extent that it would be a task to catalog them.

Lower Costs Affect Prices

In this situation we have an explanation of our unusual price history. Launching what was virtually a one-market business, naturally production was relatively small, and the cost per unit was inevitably high. However, as volume increased, and it did grow remarkably as we gradually expanded the number of markets, the cost of production dropped, too. This enabled lower prices; and as prices eased off, volume increased more, as still more industries were opened up for the product. Thus the cycle kept repeating itself.

Every manufacturer knows what happened at this juncture — cost of production did not recede as fast as the price schedule. In fact, under such circumstances manufacturing costs are likely to stabilize at a level that may jeopardize the profit margin. Certainly profits would have been wiped out altogether had we not constantly worked to keep costs down. The latter was done by adopting the most efficient production system that could be installed. Modernization is not a new program for us; we have been modernizing since 1912. Whenever we could get a new machine or new equipment or an improved manufacturing method that promised to lower costs even a fraction of a per cent, we unhesitatingly got it, though the machine or the equipment that it supplanted may have but recently been installed. We have always prided ourselves on up-to-dateness. We have tried from the first to make production facilities the last word in efficiency. Only in this way is it possible to keep that ever-receding price trend from tossing us into red ink.

Machinery Benefits Labor

Incidentally, this experience is a striking example of the economy of machinery. Production efficiency is generally attained through the use of labor-saving machinery and labor-saving methods. For this reason, it is often contended that machinery is the enemy of labor.

Just the opposite of that is true, as is proved by the accomplishments of antifriction bearings. The use of these bearings has actually created industries. The automotive business is the most conspicuous example. Without antifriction bearings motor cars could not be operated. And the automotive industries, both in production and in distribution, give employment to millions. Even after deducting from the automobile's colossal payroll the varieties of employment that the gasoline-propelled car eliminated, there is still a surplus of several million workers left who owe their livelihood to machinery.

Studies Refractories Used In Steelmaking Practice

BY GILBERT SOLER

The accompanying article is an abstract of a paper presented at a recent meeting of the refractories division, American Ceramic society. The author, Gilbert Soler, is manager of research, Timken Steel & Tube Co., Canton, O.

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ALLOY steel producers are more concerned with the quality of their steel as affected by refractories than they are with refractory service life and cost per ton. Technically trained men, familiar with the design and manufacture of refractories and with specific problems of steel production, have made considerable progress in reducing nonmetallic inclusions in steel by improving refractories.

Standard routine tests as made in the refractories laboratory of a steel plant can be supplemented by service tests and specimens taken for petrographic analysis. A thin section of slagged interface will show the structural relations between the slag and the refractory, and powder sections can be used to identify the various phases present by their optical properties. Results can be interpreted readily by the use of phase diagrams of the various oxide systems. Additional valuable data can be gained by the use of x-ray diffraction apparatus to determine the extent of solid solution phases and to identify opaque constituents.

Factors Affecting Costs

The length of an open-hearth furnace campaign is determined by the type of steel being made, the kind of fuel used, combustion conditions, furnace design, and the refractories. Cost of refractories per ton of steel produced at different plants cannot be compared unless production conditions are alike. For example, when an open-hearth furnace is operated under positive hearth pressure, refractory life will be decreased and the refractory costs per ton of steel will rise, but a large saving will be made in fuel costs. The intelligent selection of refractory materials, however, will result in longer life and lower refractory maintenance costs, as well as in higher quality steel.

Maximum flame temperature at which an open-hearth furnace can be operated is limited by the temperature at which roof brick will fail. If better refractories can be developed for this purpose, present temperature limits can be raised and substantial savings made in melting time, thus increasing the production rate of the furnace.

Silica brick particularly are suitable for use in roof and sidewall construction inasmuch as they retain their load-carrying capacity to within 100 degrees Fahr. of their fusion point. This property is attributed to the interlocking crystalline structure of the brick and to the fact that large quantities of a eutectic liquid phase are not formed at operating temperatures. The resistance of silica brick to spalling is also an important factor in their selection for this type of service.

Although acid chemically, silica brick resist basic slag conditions because of the formation of immiscible liquids with ferrous, calcium, manganese, and magnesium oxides. Sodium and potassium oxides and alumina hinder immiscibility and therefore should be avoided in the manufacture of silica refractories and in the slags used with such refractories.

Open-hearth furnace bottoms usually are made of a mixture of magnesite with approximately 20 per cent of open-hearth slag as a bond. This mixture is burned in place on the bottom in ¼- to ½-inch layers to a total depth of approximately 2½ feet. Petrographic analysis shows the mineralogical constitutents of such a bottom to be periclase, alpha or beta dicalcium silicate, and possibly an olivine phase, oxides of magnesium, iron, and manganese in solid solution, and usually some dicalcium ferrite.

During service, such a bottom will change in composition. The ferric oxide, combined as a dicalcium ferrite to provide a fusible bond when the bottom was made, may be reduced in service to ferrous oxide, which is taken into solution by the periclase along with iron oxide from the slag and bath in contact with the bottom. The new autogenous or solid solution bond thus developed holds the periclase grains together in a tight and highly refractory mass. This bottom is slightly plastic, and any cracks which form as it cools readily heal during the next heat. The resistance of the bottom to abrasion from charged scrap also is improved by this slight plasticity.

Thermochemical Relations

Magnesia is in thermochemical equilibrium with most open-hearth meltdown slags, which consist mineralogically of an olivine phase ($CaO; RO:SiO_2$). The RO content can be filled by CaO, FeO, MnO, or MgO, but CaO has the greatest affinity of these four oxides and MgO the least. Thus if the 2:1 ratio is satisfied with lime and ferrous and manganese oxides, magnesium oxide will not be combined with the silica of the olivine phase. As lime is added to the slag or works up through the bath from the bottom, the other oxides will be displaced by the formation of dicalcium silicate, which will be in equilibrium with magnesium oxide. Thus it will be noted that the magnesium-oxide content of an open-hearth slag does not increase materially.

With certain exceptions, electric-arc furnaces require the same re-

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View taken through charging door of hot electric furnace, showing severe conditions imposed on silica brick wall, particularly at the slag line

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fractories as are used in open-hearth furnaces. As the first, or oxidizing slag is similar to that used in open-hearth practice, magnesium oxide remains in thermochemical equilibrium with the slag as previously discussed. The second, or reducing slag, is "made up" from lime, silica, and flourspar, to which some coke is added. Petrographic analysis shows the presence of gamma di- and tricalcium silicate, and it is known that calcium carbide also is present. These constitutents are in thermochemical equilibrium with magnesium oxide as occurs in open-hearth furnaces.

Reducing slags of this type are peculiar in that they disintegrate or "dust." This is caused by the beta to gamma transformation of dicalcium silicate at 1247 degrees Fahr., which is accompanied by an increase in volume of about 10 per cent. It is prevented in open-hearth slags by the stabilization of the alpha or beta dicalcium silicate and by the large percentage of phosphorous pentoxide and ferric oxide present in the slag. One difficulty experienced with electric-furnace bottoms is that of the reducing slag seeping into the cracks which develop as the bottom cools. On cooling below 1247 degrees Fahr., at which the beta to gamma transformation of dicalcium silicate takes place, there is a decided expansion with a consequent rupturing of the bottom.

Deterioration of ladle linings now commonly used is attributed primarily to the action of the slag used as an insulating blanket over the steel in the ladle, although the composition, viscosity, and temperature of

Open-hearth bulkhead showing effect of impingement due to direction and velocity of outgoing flame

the steel also have an effect, low-carbon and high-manganese steels being particularly destructive. In addition, the size and shape of the ladle, and the direction and velocity of the stream during tapping, definitely affect ladle life. The period for which the steel is held in the ladle during teeming offers possibilities for the solution and entrainment of refractory particles in the steel, and considerable study remains to be done in overcoming this danger.

Fireclay brick are theoretically unsuitable for ladle lining, but as yet no truly satisfactory brick has been developed. A basic material with the proper physical properties should be ideal, but such a product is not as yet on the market. It is significant to note that although steel is made on basic bottoms and under a basic slag, inclusions of magnesium oxide or calcium oxide are not found in the steel. These basic substances are not soluble in steel, and apparently are not wetted by it. They also are resistant to the action of basic slags and fluxes. Chrome and magnesite brick have been tried in ladles but have not been found satisfactory because of spalling, high-heat conductivity, or chrome contamination of the steel.

Other important points which are possible sources of nonmetallic inclusions in the ingot are runners, sleeves, nozzles, stoppers, hot tops, and mold plugs. Refractories for sidewalls, roofs, and bottoms of the soaking pits, reheat furnaces, forging furnaces, and heat-treating furnaces must be selected to prevent bottom contamination or the possibility of the surface being contaminated by spalls or drops of molten refractory material.

The steel producer is doing everything in his power to improve the quality of his product and is willing to co-operate with the refractory manufacturers in an effort to develop new or improved materials which will stand up under the severe service imposed in steelmaking operations and which will aid the steelmaker in improving the quality of his steel.

Hardfacing Glass Shearing Blades

THE operator shown in the accompanying illustration is applying hard-facing alloy to glass shear blades in the Toledo, O., plant of the Libby Glass Mfg. Co. These blades are used for cutting off the surplus from the suction mold used for making blown water glasses. The glass is red hot and plastic at the time of the cut so that the blades operate at extremely high temperatures. Shear blades hard faced with cobalt-chromium-tungsten alloy manufactured by the Haynes Stellite Co., Kokomo, Ind., outlast the hardened steel blades formerly used at least 10 times and have been standard since 1928. Steel blades simply cannot stand up against the terrific heat and abrasion of the shearing operation. Both tool costs and shut-downs are greatly reduced through the use of hard faced blades. Only 1/10-pound of hard facing alloy and 5 minutes welding time are required to protect each blade

THE YEARBOOK ISSUE *Jan. 6, 1936*

The Theme of the Yearbook issue will be

PROGRESS in 1935

paves the way for

PROFITS in 1936

THE 1936 Yearbook issue of **STEEL**, dated January 6, 1936, will picture, to a greater extent than recent annual issues, the parade of progress in the iron, steel and metalworking industries. Instead of placing emphasis upon the problem of government—industry relations, as was the case in the issues of 1933, 1934 and 1935, the 1936 Yearbook will be devoted principally to the timely and appropriate service of interpreting for **STEEL**'s readers the great significance of the improvements in materials, methods and equipment recorded during the past year.

Many thousand executives—presidents, proprietors, vice presidents, secretaries, treasurers, works and general managers, purchasing agents, engineers and foremen know, read and preserve the Yearbook for the completeness of its information and its continuous reference value.

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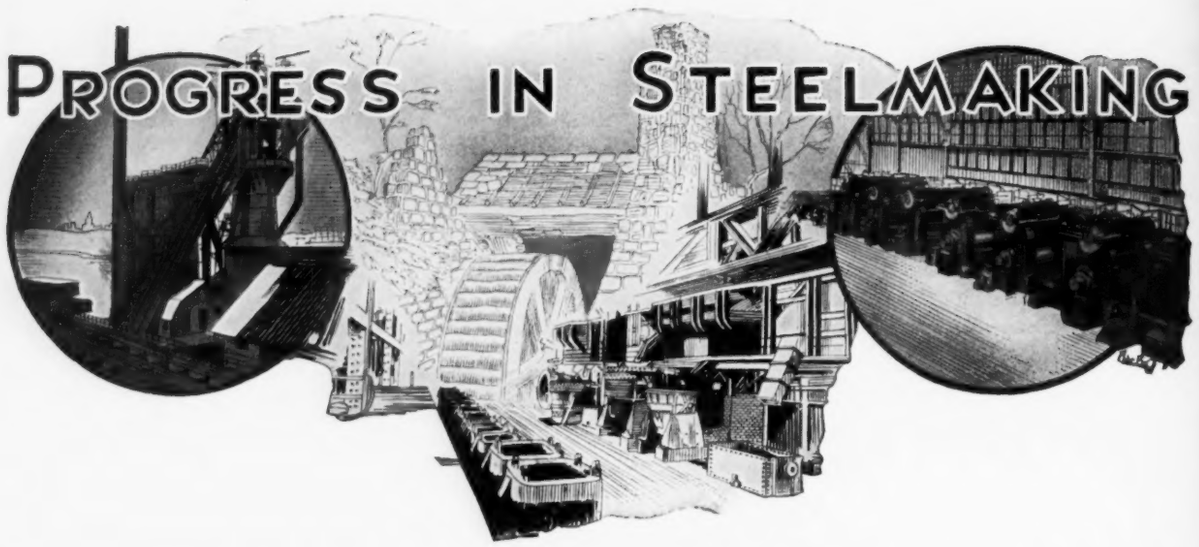
PROGRESS IN STEELMAKING



Power Savings Are Effected

Installation of a centralized lubricating system shows excellent returns on the investment especially on roll trains equipped with the old-style babbitted and brass bearings, according to a steel plant lubricating engineer. Power savings ranging from 15 to 35 per cent have been obtained and the life of the bearings increased many times. Less wear of the bearings occurs and closer roll alignment is maintained, thus permitting the product to be rolled to closer tolerances.

• • •

New Control Is Automatic

Constant draft within the furnace has been made possible by the development of a new type control which adjusts the stack damper continually. It serves to increase the carbon dioxide and at the same time reduce the flue temperature. As the percentage of carbon dioxide in a boiler is increased the savings increase rapidly. Motion of the damper beyond the open and closed positions is prevented by travel limit devices built in the damper motor. The draft switch, which is fully enclosed, is of the diaphragm type.

• • •

Simplifies Manipulation of Heavy Coils

UPENDS COILS OF BROAD STRIP STEEL—A system of heavy duty conveyors for handling wide strip in coils weighing up to 10 tons each recently was installed in the finishing department of one of the modern strip mills in this country for positioning the strip at the charging end of the continuous pickling machines. The conveyors shown in the accompanying illustration receive from crane and magnet, coils of steel brought from coil storage areas and deliver them to a coil upender which in turn lowers them so that their core axis is horizontal. In this position the coils are discharging onto a roller conveyor which transfers them to a tilting table. Both the upender and tilter are remote controlled. The coils are skidded from the tilter to a decoiler and then are fed into the continuous pickling tanks. The conveyor installation is a product of The Mathews Conveyer Co., Ellwood City, Pa.

Bearings Resist Impact

Laminated fabric-base bearings made of interwoven belting are more resistant to impact than those made of the more finely woven material, and will withstand adverse operating conditions somewhat better. Heavy-duty belting-base material, therefore, is recommended for mills where impact is heavy, such as 3-high water mills for breaking down heavy sheet bars into sheets. It also is recommended for all initial installations in a change-over from metallic bearings, except in cases where the necks are reground and the operating conditions favorable. In the latter case, use of the medium weave fabric-base material results in additional power saving.

• • •

Extends Life of Equipment

One of the most advanced systems for ventilating and cooling electric drives now is being installed at a broad strip mill in the Great Lakes district. Hot air from the motors and generators is discharged into ducts located in the basement and thence through finned type surface coolers which extracts the heat. The cooled air then is returned to the motor room. By this arrangement the life of the equipment is extended and the operators are enabled to work with greater comfort.

Getting a Leap on LEAP-YEAR!

HE'S MAKING A CALL *NOW* THAT WILL MEAN 366 DAYS OF SAVING *NEXT YEAR*

● He's made a discovery. Lubrication shows up under many headings on the past year's cost sheets. There were repair bills due to faulty machine lubrication, production difficulties resulting from cutting fluid problems, tool costs—and always labor costs and delays when lubrication failed.

All of these must be totaled in order to measure lubrication costs or effectiveness. The call he is making *now* will establish new records of economy in his plant throughout the whole of next year. He is calling his local Standard Oil office.

What Standard Service Can Do

It cuts costs and eliminates problems by three definite assurances: (1) unexcelled quality and range of products; (2) practical cooperation of experienced and competent lubrication engineers; and (3) dependable availability and prompt delivery of the product needed. Using this single source for all lubricants and other petroleum products produces measurable savings in costs; is also a convenience for the entire plant.

. . . and it can happen to you

"Let a test tell the tale," said a manufacturer of steering gears. The Standard Oil Engineer recommended Acme Cutting Oil. In three months an actual purchasing saving of over $350.00 per month was shown. Further, a definite saving in longer tool life over the first five months of the previous year.

A puzzle they were unable to solve brought a call for a Standard Oil Engineer from a company near Chicago. They were having serious trouble in the application of Acme 150 Cutting Oil, used in cutting galvanized nipples. These turned black on being rinsed in a conventional alkaline solution. An inspection of routine was made and a paraffine oil bath was recommended immediately after cutting. This eliminated all discoloration, besides reducing manufacturing costs.

Copr. 1935, Standard Oil Co.

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- ☐ "Lubrication in Grinding Operations"
- ☐ "The Lubrication Engineer —His Value to You"
- ☐ "Lubrication in Gear Cutting Operations"

(Attach list of any additional subjects in which you are specifically interested.....)

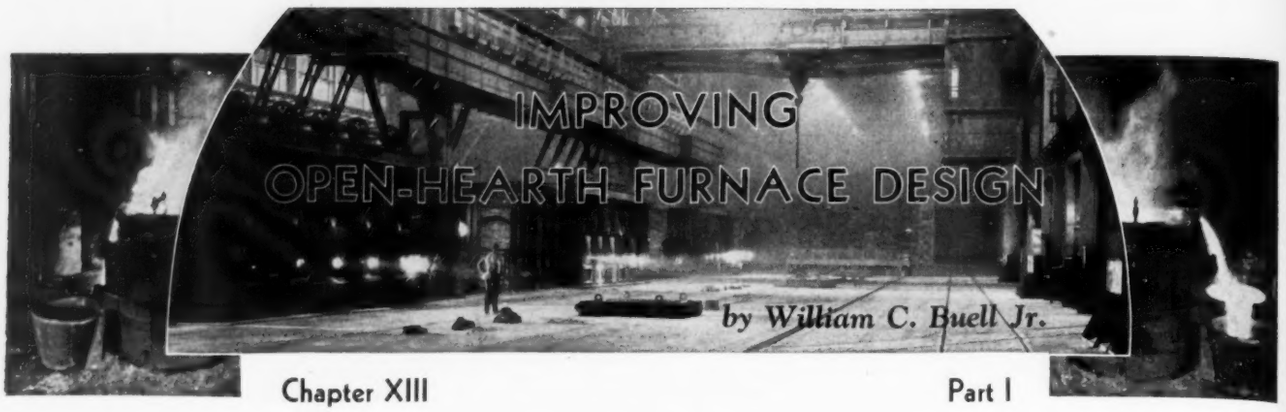
Name .....

Position .....

Company .....

Address .....

City ..... *State* .....



IMPROVING OPEN-HEARTH FURNACE DESIGN

by William C. Buell Jr.

Chapter XIII — Part I

Waste-Heat Boilers

AFTER leaving the regenerators the furnace gases cease to be of value to the open-hearth metallurgical process and become waste, although still containing much heat. Efforts to effect secondary heat transfer through auxiliary regenerative or recuperative devices by means of which it has been proposed to salvage additional sensible heat for return to the furnace proper have shown little or no benefit to the process. Consequently, the secondary heat recovery or salvage takes place in waste-heat boilers which at present are of general application to all larger open-hearth furnaces. Of the typical furnaces only P and B are not so equipped.

As of present approved design the regenerators collectively are of relatively great size and in them the furnace gases are lowered in temperature from perhaps 2800 or 2900 degrees to a range of 1000 to 1400 degrees Fahr. depending on the particular practice, a total temperature reduction of say 1700 degrees Fahr.

The outlet temperatures of the furnace gases after passing through waste-heat boilers will be 400 to 600 degrees Fahr., an added maximum drop through flues and boiler of about 700 degrees, or roughly 40 per cent of the initial drop through the regenerators.

Volume Must Be Increased

If the regenerators are enlarged and the checker volume increased sufficiently to reduce the temperature of the furnace gases after passing through them to the temperature at their exit from the waste-heat boiler, then the volume of the checkers will have to be increased to more than two and one-half times their present size, in producer gas practice, and nearly as much in other fuel practice. Obviously, such an increase in regenerator capacity could not be justified economically.

Little heat will be lost in the well-constructed and maintained flue system having slide valves, and this loss will come mostly from the water cooling of the valves. There will be some dilution of the furnace gases from air infiltration at valves and manholes, which may be nominal, Table CXXX, or considerable, Table CXXIX, line 33, depending on the order of design and maintenance.

When the furnace gases from producer gas operation reach the waste-heat boiler at 1350 degrees Fahr. they contain 42.8 per cent of the total heat of the primary fuel, (Fig. 169) coke oven gas at 1200 degrees contains 27.5 per cent (Fig. 171) and oil at 1250 degrees, 27.3 per cent (Fig. 173). These values are for perfect combustion. If excess air is present and the temperature remains the same, the percentage of contained heat will be higher.

How Boiler Output Is Calculated

Gases leaving the boiler at 600 degrees in producer gas firing contain 18.1 per cent of the total heat of the fuel and at 500 degrees for the fixed fuels contain 11.0 per cent for coke oven gas, and 12.0 per cent for oil. Assuming a radiation loss of 5 per cent at the boiler the total heat represented in the steam will be about 23.5, 15.7, and 14.6 per cent, respectively, for the three fuels, or at the 5,000,000 B.t.u. practice assumed in the proposed producer gas furnace and 4,000,000 B.t.u. of the fixed fuel designs the salvaged heat in the steam would be 1,175,000, 628,000 and 584,000 B.t.u. per ton of ingots produced, which at 34.5 pounds of steam, 970 B.t.u. per pound represents 35.1, 18.7, and 17.4 boiler horsepower, or 1210, 646 and 602 pounds of steam, respectively.

Achievement Is Doubtful

These figures represent the acme of design and operation, and probably cannot be achieved in practice. However, the continued delivery of steam in materially larger quantities than those stated, after giving effect to a straight line correction for the difference in the basic fuel rate is an excellent indication that a material betterment of furnace practice is possible.

The probable delivery of waste-heat steam can be found by the use

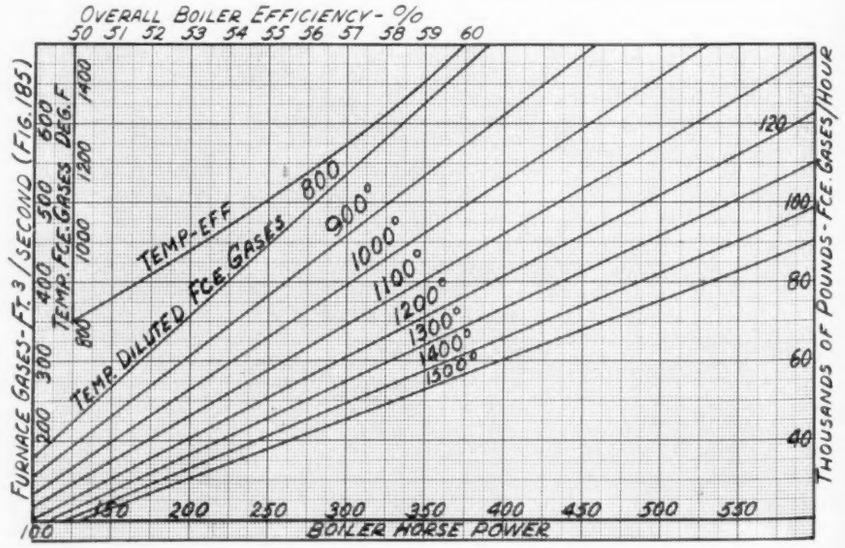


Fig. 202—Probable delivery of waste heat steam. For specific conditions evaluate chart, Fig. 185, to center of vertical scale for gas volume

Table CXLIII

Waste-Heat Boilers Serving Typical Furnaces

Furnace	Boiler Design	Type	Nominal rating, horsepower	Exhaust fan drive
	a	b	c	d
A	Erie City	3-pass vertical water tube	600	motor
J	Freyn	Small horizontal fire tube	640	motor
K	Freyn	Small horizontal fire tube	600	motor
N	Heine	3-pass vertical water tube	900	motor
O	Heine	3-pass vertical water tube	900	motor
I	Freyn	Small horizontal fire tube	600	motor
P	None			
G	Freyn	Small horizontal fire tube	550	motor
L		Small horizontal fire tube	600	motor
B	None			
D	B & W	3-pass horizontal water tube	320	turbine
E	Erie City	Small horizontal fire tube	550	motor
H	B & W	3-pass horizontal water tube	500	turbine
F	Freyn	Small horizontal fire tube	600	motor
M	Sterling	3-pass vertical water tube	550	motor

giving such excellent results as the prime steam generators of the power plant. These boilers were relatively expensive, and required much valuable floor space and costly settings in their installation. The settings were difficult to keep tight against leakage and on account of the considerable quantities of dust inherent to the process, adequate cleaning was difficult or impossible. Even when clean the draft pressure necessary to move the gases through the boiler was of considerable magnitude. On account of the low temperature of the entering gases and faulty distribution through the boilers from high draft, boilers of the multipass type were calculated to

of the chart, Fig. 202. This assumes that the generation of steam will be accomplished in a boiler whose heating surface is calculated as 12.5 square feet per rated horsepower, (34.5 pounds of steam, f and a). The entering gas temperature is assumed as 1350 degrees in producer gas practice, 1250 degrees for oil or tar, and 1200 degrees for other fuels with perfect combustion. After dilution the entering gas temperature will decrease approximately as the volume increases. The temperature after dilution is that used to evaluate either section of the chart. The chart is developed to represent average conditions of operation, not maximum conditions, which is the basis of development, Fig. 185.

Steam boilers have long been used for open-hearth waste-heat salvage and beginning about 1910 the subject came to receive careful consideration on account of rising fuel costs. During the subsequent 15 years many costly installations were made, the choice boiler installation during the period being the multipass water tube types, an adaption of the same boiler types that were then develop but approximately 70 per cent of their nominal rating, (0.7-boiler horsepower developed per 10 square feet of heating surface).

Table CXLIV

Waste-Heat Boiler Test—Furnace E

(One heat—550-horsepower boiler)

At end of	STEAM Produced lbs.	STEAM Pressure, lbs. gage	STEAM Superheat degrees Fahr.	STEAM Total temp., degrees Fahr.	FURNACE GAS Ingoing temp., deg. F.	FURNACE GAS Outgoing temp., deg. F.
	a	b	c	d	e	f
1st hour	16,400	153	75.5	440	1060	472
2nd hour	15,800	150	71.0	434	1060	469
3rd hour	16,100	152	72.0	436	1060	464
4th hour	16,800	147	73.6	435	1060	466
5th hour	15,400	143	68.6	428	1000	455
6th hour	14,700	146	67.1	428	990	457
7th hour	16,100	148	64.0	426	1000	462
8th hour	16,100	150	69.0	432	1030	476
9th hour	17,500	154	70.0	435	1090	462
10th hour	16,100	149	74.5	437	1090	480
Average	16,100	149	70.5	433	1044	466

Factor of evaporation = 1.088
Equivalent steam f and a = 17,540 pounds per hour or 508 boiler horsepower or 92 per cent boiler rating

About ten years ago the fire tube boiler having small diameter, closely spaced, horizontal tubes was introduced to the open-hearth plant, immediately proved its superiority and the waste-heat boiler equipment of all plants constructed since its introduction included this design.

Single-Pass Unit Effective

Boiler operation has demonstrated that given sufficient transfer area, the furnace gases will give up as much, or more heat in a single pass 18 to 20 feet long, as in the multipass type, much less floor space and head room is required for installation, the settings are simple and easily maintained tight, cleaning is accomplished easily and completely, the draft requirements are nominal and the cost of the equipment is much lower than boilers of the older types.

Fig. 203* illustrates the salient features of the cross flow and parallel flow multipass types the de-

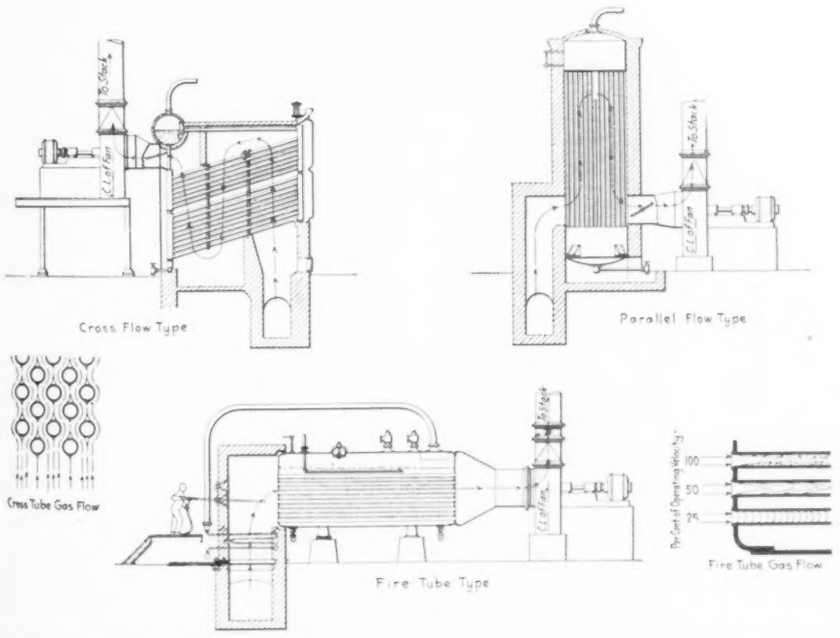
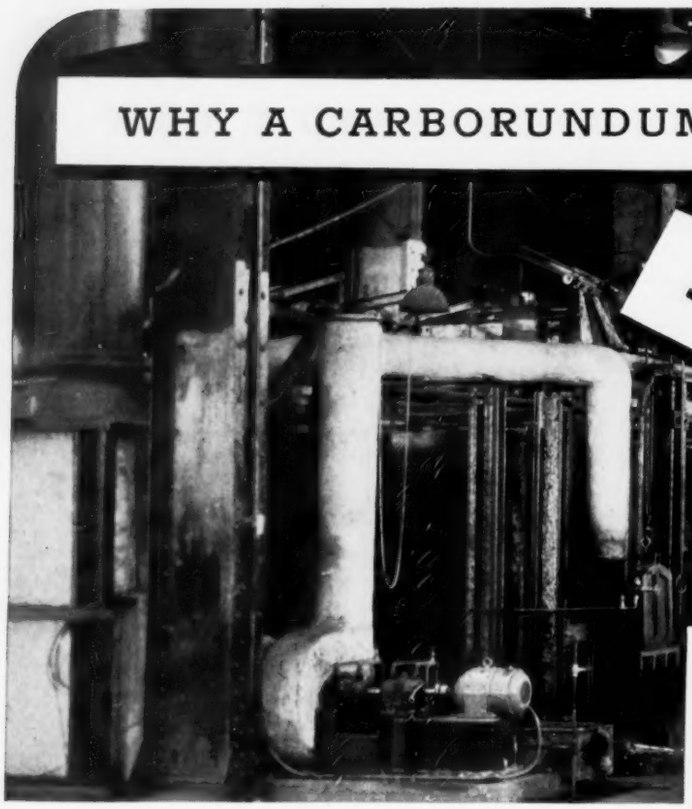


Fig. 203—Types of waste-heat boilers found in open-hearth practice and indicating the advantages of the horizontal fire tube design

*From a paper on "Waste-Heat Boilers in Steel Mills" by F. H. Willcox and J. C. Haves, presented before the Western Society of Engineers, Chicago, Nov. 16, 1925.

WHY A CARBORUNDUM RECUPERATOR?

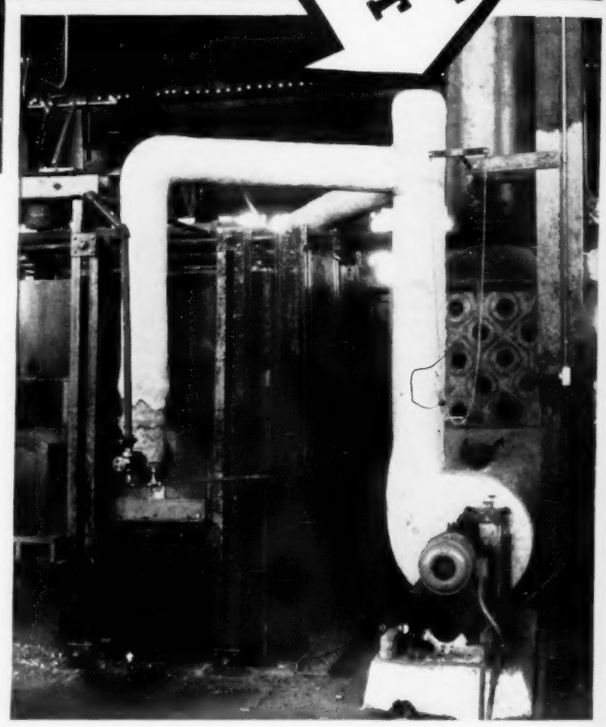


LOW FIRST COST

THE true basis for figuring the cost of a recuperator to meet definite requirements as to amount and temperature of preheated air is the complete installed cost. The cost of heat transfer elements should not be a first consideration.

The Carborundum Company Recuperator utilizes "Carbofrax" tubular heat transfer elements mounted between terminal walls of fireclay blocks accurately sized with ground contact faces. The result is a compact, accessible, dependable and flexible design easily applied to any type of furnace. The installed cost is approximately the same and in many instances lower than that of other types of recuperators, because:

1. "Carbofrax," the Carborundum Brand Silicon Carbide Refractory, transfers heat so rapidly that a minimum amount of heat transfer surface is required.
2. It is an extremely compact installation resulting in reduced housing and foundation costs.
3. In many installations, the recuperator terminal walls serve as the outside walls of the structure eliminating the cost of exterior housing.
4. The flexibility of design often permits the recuperator to become an integral part of the underground flues or stack base, thus adding but little construction costs.
5. The refractory construction used throughout eliminates the necessity for temperature protective devices.



In this installation on a billet heating furnace the permanent walls of the recuperator serve as the outside walls and the recuperator structure is incorporated in the stack base.

TUNE IN THE CARBORUNDUM BAND
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THE CARBORUNDUM COMPANY RECUPERATOR

EQUIPPED WITH "CARBOFRAX" TUBES

Send for Illustrated Engineering Data

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Refractory Division Perth Amboy, N.J.

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signs often found in installation made prior to 1925, and of the fire tube or the type of present favor. The advantages of the latter type are apparent from visual inspection.

The general specifications of the waste-heat boilers as found with the typical furnaces are listed in Table CXLIII. The seven horizontal fire tube boilers listed have been installed since 1929, and the six of other types prior to that time.

The boiler test, Table CXLIV taken over one heat, in Furnace E, from which 154 tons of steel was produced with a fuel oil consumption of 5,100,000 B.t.u. per ton will prove interesting in illustrating a number of operating factors. Assuming the same oil used as the development basis of Fig. 173, the consumption was 34.1 gallons of fuel per ton of ingots. It now may be calculated that under the foregoing conditions and in order to generate the quantity of steam delivered, about 95 per cent excess air must have been present in the furnace gases. Thus, at 1050 degrees Fahr. (average entering gas temperature):

	B.t.u.
Heat in furnace gases 34,000 B.t.u. × 34.1 gallons	1,159,400
Heat in 95 per cent excess air 28,000 B.t.u. × 0.95 × 34.1 gallons	907,000
Total heat to boiler	2,066,400

At 460 degrees Fahr. (average leaving gas temperature):

Heat in furnace gases, 15,000 B.t.u. × 34.1 gallons	511,500
Heat in present excess air, 12,000 × 0.95 × 34.1 gallons	388,700
Total heat from boiler	900,200
Heat left in boiler	1,166,200
Radiation loss, assumed as 5 per cent	58,300
Heat to steam	1,107,900
Total steam per hour in pounds, 1,107,900 × 15.4/970	17,600

This is about 510 boiler horsepower total, or 33 per ton of ingots per hour, as against an ultimate of 17.4 which after making an allowance for the fuel rate actually secured, 17.4 × 5,100,000 / 4,000,000 = 22.3 boiler horsepower per ton of ingots, which should be the "bogey" for this particular operation. The foregoing demonstrates an unduly high return in waste-heat steam which is a positive indication of faulty design, maintenance and/or operation, (excessive excess air in this case).

The convenience and simplicity of the small horizontal fire tube boilers is well illustrated by, Figs. 204 and 205. The entire installation, including the stack connection is under the leanto floor, leaving this floor free for necessary storage or other purposes. It is also obvious, Fig. 204, that lancing the tubes is a simple matter, as is also the maintenance of the setting against air infiltration.

Generally, open-hearth waste-heat boilers are equipped with simple superheaters which are placed in an enlargement of the flue between furnace and boiler. A typical arrangement is shown in the flue of the horizontal fire tube boiler, Fig. 203. Boiler feed pumps and feed-water heaters of conventional steam practice are included.

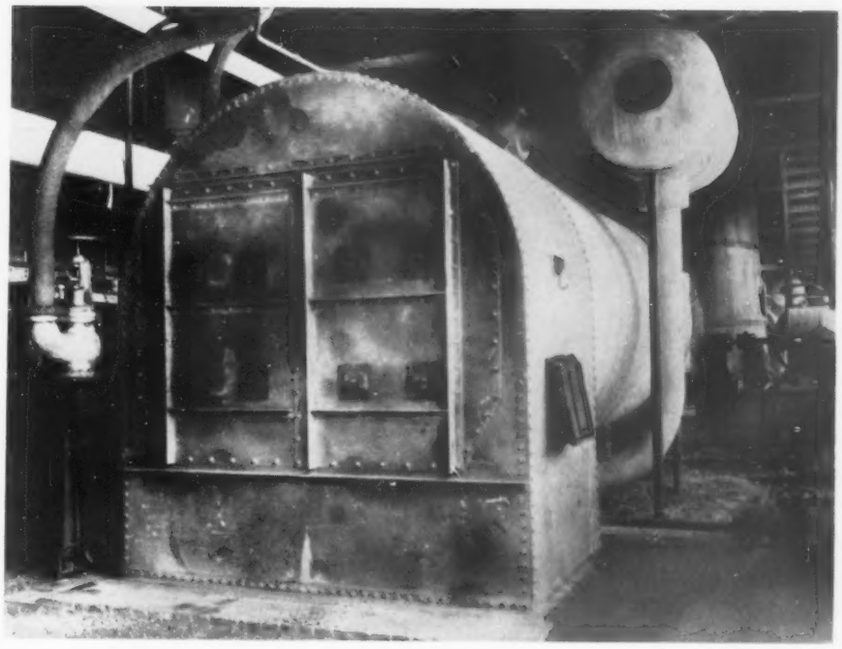


Fig. 204—Receiving end of 600-horsepower small horizontal fire tube boiler furnace I, which illustrates the simplicity of the installation

Draft Fan Important

It is important that the induced draft fan be of sufficient size, amply powered to move the furnace gases in the volumes and at the temperatures of the process, and to develop appropriate draft pressures that will best aid in the accomplishment of the primary purpose of the process, the production of steel. Induced draft fans may be turbine or motor driven, but 11 of the 13 furnaces, Table CXLII, operate with the latter type of drive. When a fan is steam driven, the requirements of steam for turbine and feed-water pump may be as high as 15 or 20 per cent of the total steam generated, the water rate of the relatively small turbines being high. Motor drive lends itself more readily to control from the operating panel on the charging floor, from which point regulation should be made and is the recommended arrangement.

(To be continued)

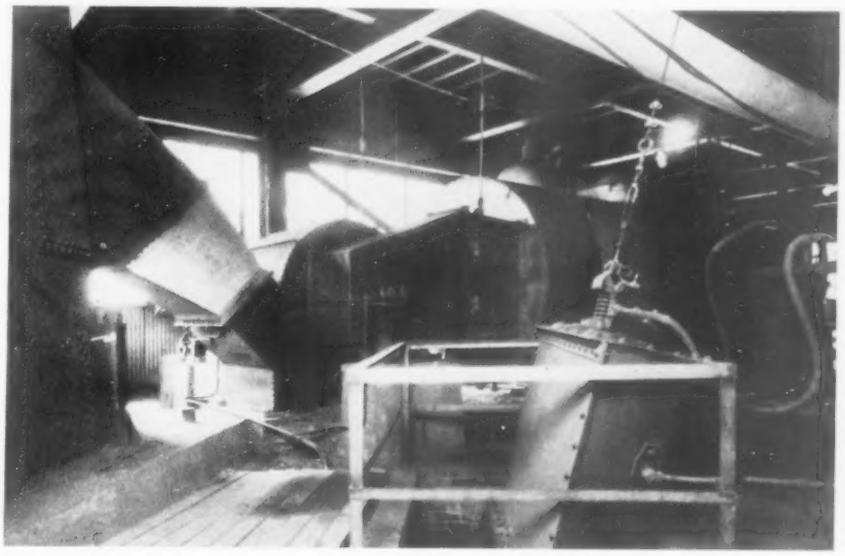


Fig. 205—Rear end of boiler, Fig. 204, showing induced draft fan, breeching and stack connection. Note the closed stack damper in foreground and that entire installation of boilers and auxiliaries is below the leanto floor

Experts Discuss the Metallurgy and Properties of Present-Day Tool Steels

PROBLEMS relating to the metallurgy and properties of tool steels occupied the attention of members of the American Society for Metals at a session on Oct. 4 during the society's recent seventeenth annual convention in Chicago. Three papers on these subjects were presented and discussed.

Hardening characteristics of 1 per cent carbon tool steels were studied and reported in a paper by T. G. Digges and Louis Jordan, metallurgical staff, national bureau of standards, Washington. Two commercial steels were selected from widely used brands of one foreign and five domestic manufacturers, the selection being made on the basis of their widely different depth of hardening characteristics. Specimens of each steel were prepared with three different initial structures, namely spheroidized cementite, coarse pearlite, and sorbite, and a study was made of the effect of these initial structures on the austenitic grain size and grain growth characteristics and on the critical cooling rates. These data also made possible a direct comparison of the relations between austenitic grain size and critical cooling rate of the two steels over a range of quenching temperatures of 1425 to 1775 degrees Fahr.

Initial Structure Affects Cooling

The investigators found that for quenching temperatures below that at which all the carbon is completely dissolved in the austenite, both austenitic grain size and critical cooling rates are influenced to a large degree by the initial structure of the steels. Above this temperature each steel approached both a grain size and critical cooling rate which was characteristic of the steel regardless of its initial structure.

At the highest temperature, namely 1775 degrees Fahr., characteristic grain size was smaller and the characteristic critical cooling rate was higher for the steel known to have been made under conditions producing so-called controlled grain size. In the correlation of austenitic grain size with critical cooling rates, the noncontrolled grain size steel showed a marked effect of grain size throughout the entire range of quenching temperatures. Influence of the initial structure was also evident at the lower quenching temperatures.

The critical cooling rate of the controlled grain size steel changed very appreciably with little or no change in austenitic grain size. At the lower quenching temperatures differences in carbon content and carbon distribution in the austenite may be the controlling factors, but at higher temperatures oxides or carbides introduced for grain control are probably the effective factors in changing the critical cooling rate.

The initial structure of the controlled grain size steel exerts an influence on the grain size-critical cooling rate relations at both low and high quenching temperatures. Messrs. Digges and Jordan stated that a few determinations made on a noncontrolled grain size steel indicated that the critical rate of this steel with austenitic grains containing carbon above eutectoid composition is lower than that for the same steel with grains of the same size containing about eutectoid proportions of carbon.

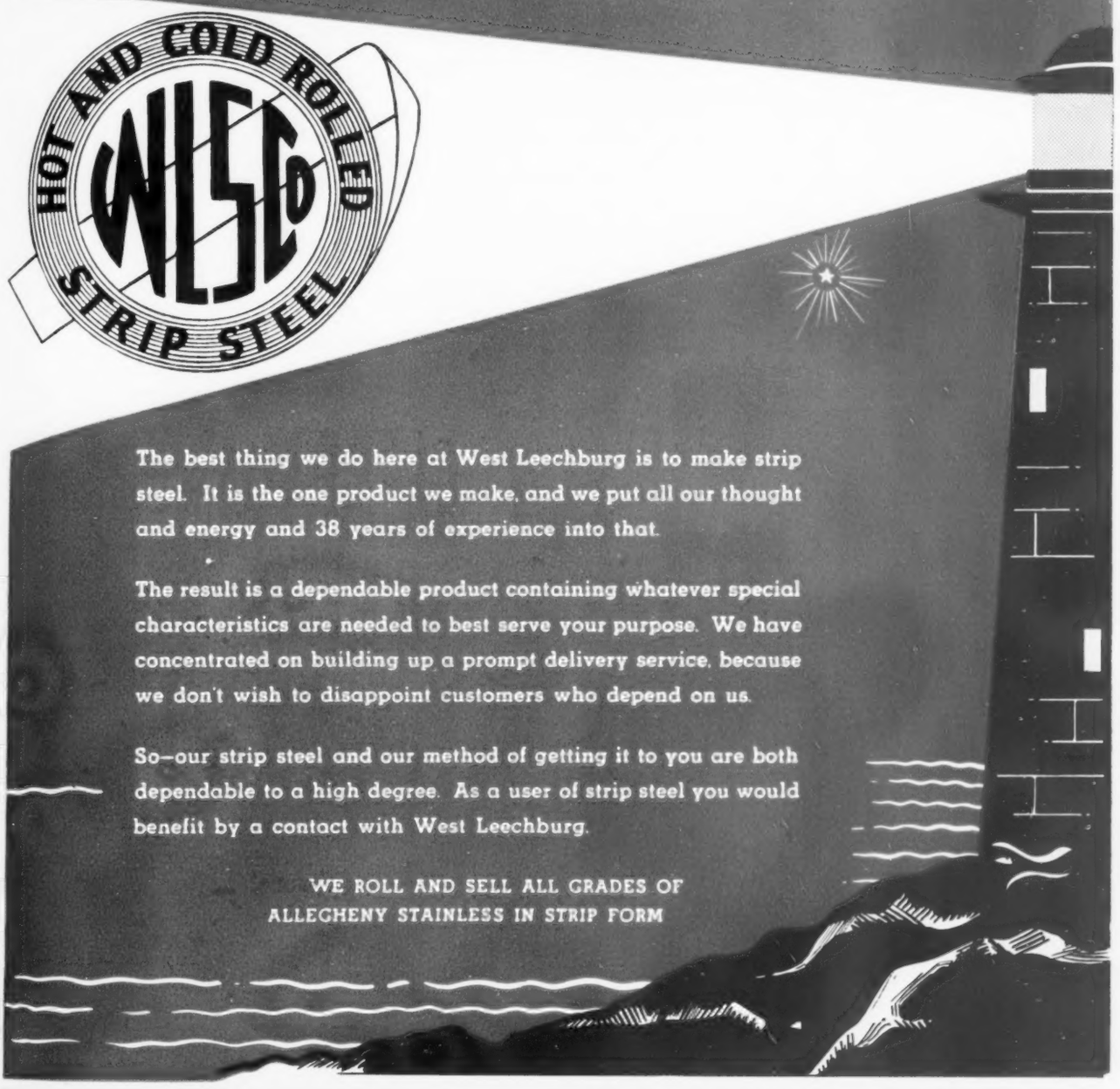
R. Schempp, metallurgist, Halcomb Steel Co., Syracuse, N. Y., contributed a written discussion in which he commended the authors for their important work. "Grain size control" and "inherent characteristics are two widely used phrases today, he pointed out. The prevailing idea is that steel has certain characteristics inherently and will react similarly in all conditions when heat treated from the same temperatures. This point of view, generally believed, is not true as the final product is influenced by many factors.

Factors Affecting Grain Size

Controlled grain size steel implies addition of inhibitors in sufficient quantities to prevent grain growth at elevated temperatures. This implication, grain size control, Mr. Schempp maintained, is not only a function of chemical composition but also of the melting practice, teeming, the rate of solidification, and once solidified, these factors help to determine the inherent characteristics at the various temperatures; while prior structure, hot and cold working, and soaking time influence the final result.

In another written discussion, T. E. Hamill, naval gun factory, Washington, stated that the paper of Messrs. Digges and Jordan gives further light on why certain 1 per cent carbon steels show such large variation in depth of hardening and hence physical properties. Bain and Shepherd have shown that the prior or prehardening structure of high

DEPENDABILITY



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carbon steels has a pronounced effect on the austenitic grain size and depth of hardening, but it appears to be shown even more clearly in the present paper.

This paper, continued Mr. Hamill, proves that the amount and size of the free carbides have a definite effect on the austenitic grain size and critical cooling rate in the noncontrolled grain size steel. In the controlled grain size steel, at temperatures below 1550 degrees Fahr., the alumina or aluminum appears to be more effective in increasing the critical cooling rate than it does controlling the austenitic grain size. Above 1600 degrees Fahr., where all of the carbides are in solution, the alumina (or aluminum) appears to be effective in controlling both the austenitic grain size and the critical cooling rate.

Discusses Torsion Impact Curves

A paper by G. V. Luerssen and O V. Greene, metallurgical department, Carpenter Steel Co., Reading, Pa., discussed the characteristic torsion impact curve on quenched and drawn tool steel presented by them in previous papers. It was the purpose of the paper to show that the peculiarities of this curve can be explained by structural and physical changes occurring in the drawing operation. Particular reference was made to the drop in impact resistance between drawing temperatures of approximately 350 and 450 degrees Fahr. on the plain carbon steels. It was shown that this drop in impact is accompanied by a drop in ductility, and by means of reconstructed impact curves calculated from hardness and ductility measurements, this decrease in ductility is proved definitely to account for the drop in impact value.

Correlation was then made by the authors between impact resistance and thermal, X-ray and volume change data, and it was shown that the drop in ductility, and consequently in impact value is caused by a structural change involving the decomposition of austenite. Direct comparisons were made between torsion impact curve and length change and magnetic curves.

Comparisons also were made between impact curves plotted from quenched and drawn specimens, and from specimens quenched, cooled in liquid air and drawn, from which it was concluded that the first, or rising stage of the curve is the result of stress relief in the quenched martensite, the second or falling stage is caused by breakdown of retained austenite to the less ductile martensite, and the third or rising stage results from the gradual breakdown of martensite into the softer more ductile constituents.

F. G. Tatnall, Baldwin-Southwark Corp., Philadelphia, in a written discussion commented that perhaps this paper is only the beginning of correlation of torsion impact and other well-known properties but even though the authors explore no farther into physical relationships, in this paper, they seemed to have established torsion impact as no longer mysterious nor oddly detached.

The comment of Howard Scott, research laboratories, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., was that the author's interpretation of the torsion impact test is chiefly concerned with the significance of constitutional effects. This treatment of the subject is quite pertinent, but it ignores the distinctive challenge to the testing engineer that their original work has presented, namely, the pronounced failure of the test results to conform with those of tension or bending. Until we can explain this lack of conformity, our knowledge of metal failures is on an insecure foundation. If our basic concepts were adequate, the results would have been obvious. There remains then the fundamental question: Why do the torsion impact curves not conform substantially with those of bending impact?

Continued Mr. Scott, the new information in the paper of Messrs. Luerssen and Greene and particularly that on angle of twist undoubtedly will be of material value in answering the foregoing question. This is the third of a series of papers that will undoubtedly be a dominant factor in leading to a more comprehensive knowledge of the mechanism of fracture of metals.

Questions Author's Statement

Stating that he had never questioned the data which the authors had presented or the conclusions that this data represented in a very graphical way some changing properties of the test pieces, S. C. Spalding, metallurgist, American Brass Co., Waterbury, Conn., said he did question, however, the propriety of saying that the points of maximum toughness as shown by the torsion impact tests represented real points of maximum toughness of tools in practice, or, in other words, how far the results could be utilized to guide us in the heat treatment of tools. Apparently, in the light of further work which they have now done, Mr. Spalding said the authors too appear to be somewhat in doubt when they state: "It is thus seen that the torsion test reveals some very important fundamental properties of hardened and drawn tool steel. The very fact that these properties are fundamental, however, makes it necessary to apply the test to practical problems with care and with full knowledge of the design of the tool and its purpose."

Effects of several furnace atmospheres on the grain size, temperature of incipient melting and extent of decarburization of a molybdenum high speed steel were studied and reported in a paper by Arthur Phillips, professor of metallurgy, and M. J. Weldon, graduate student, department of metallurgy, Yale university, New Haven, Conn. Composition of the steel was: Carbon 0.77, manganese, 0.32, silicon 0.47, chromium 3.93, molybdenum 7.05, vanadium 2.05 and tungsten 0.07 per cent. From the standpoints of temperature and time the heat treatments covered a wide range, although particular attention was devoted to the experimental conditions closely approaching standard hardening practice.

Water Vapor Has Influence

The authors found that the most pronounced structural alterations are produced by oxidizing atmospheres, particularly those containing an appreciable water vapor concentration. No evidence was obtained that the grain growth and other abnormal effects of oxidizing atmospheres are due to self-heating of the steel as suggested by J. P. Gill in referring to Sam Tour's results on tungsten high speed steel.

In a written discussion, Sam Tour, vice president, Lucius Pitkin Inc., New York, stated it was pleasing to see that Messrs. Phillips and Weldon had carried out a complete program and had found results similar to those he had reported in 1932 and 1930. The present investigators have worked on a molybdenum high speed steel. Mr. Tour felt, however, that their results have amply confirmed his previous results, in addition to having proved that the same phenomenon applied to both the molybdenum and tungsten type of high speed steel.

Concluding, Mr. Tour called attention to the fact that grain growth as affected by furnace atmospheres is of importance in nonferrous metals as well as in steels, but whether grain growth will be promoted or inhibited is a peculiarity of the alloy itself. For example, it seems that oxygen or oxygen-carrying gases promote grain growth in high speed steels, whereas in some nonferrous alloys, oxygen and oxygen-carrying gases seem to inhibit grain growth, while hydrogen promotes grain growth. It, therefore, becomes a specific problem for each

alloy and a considerable amount of experimental work and information will be necessary before all of these gas-metal problems can be solved or even very well understood.

J. P. Gill, chemical metallurgist, Vanadium-Alloys Steel Co., Pittsburgh, commenting on the paper of Messrs. Phillips and Weldon, said the information regarding susceptibility to grain growth in molybdenum high speed steels as affected by different atmospheres, if the differential in temperatures is excepted, substantially the same as that reported by Mr. Tour on an 18 per cent tungsten high speed steel. There is also a marked similarity between the authors' results and procedure with some of the original work of his laboratory on the same steel.

Experiments of his laboratory, continued Mr. Gill, indicated that unusual care and technique were required. Consequently, he was surprised that the authors used sheet stock approximately only 1/16-inch thick; which stock was hot rolled with an admitted decarburized surface, possibly a demolybdenized surface and no statement on their part as to whether the hot rolled scale or oxide was removed from the samples.

Uniformity Is Necessary

Since surface reactions are so important, it is most necessary that every precaution be made so that the specimens have a uniform surface representative of the body of the metal and a surface condition which is definitely known. In many experiments conducted by Mr. Gill and his associates, a much more intense reaction was found at the surface of the specimen than in the body of the specimen. This zone in some instances was as deep as 0.030-inch. Had specimens been made of sheet stock only 0.065-inch thick, it is obvious in some cases that the zone of more intense reaction would have extended entirely through the specimen.

Several years ago, stated Mr. Gill, his laboratory conducted a number of experiments on an 18 per cent tungsten high speed steel to determine the effect of gases on grain size and structure. Specimens were ¾-inch diameter and 1½ inches long and were machined all over. Two different furnaces were used, one a molybdenum wound electric furnace with a silicon tube. Gases of known composition were premixed and passed over the specimens in much the same manner as did the authors. The other furnace was a controlled atmosphere unit, adjusting the atmosphere in a number of instances to correspond in composition to some of the atmospheres used in the molybdenum wound furnace. In all cases a thermocouple was placed directly against the specimen.

Comparison of grain size resulting

in specimens treated in different furnaces and using substantially the same atmospheres was not consistent. Investigating the reason for this, a hole was drilled longitudinally into the specimen and a thermocouple placed in the center. Using this thermocouple for control purposes, results between the two furnaces were much more consistent, but it was found also that the different gases had a much lesser effect on grain growth than had originally been assumed. It was found that in using so-called highly reducing atmospheres the specimens did not come to temperature as rapidly as when using so-called highly oxidizing atmospheres and that in several cases where oxygen had been introduced into the atmosphere the specimens became hotter than the furnace temperature.

Since grain size is affected by both time and temperature, it was found that by adjusting the furnace temperature so that the specimens would come to temperature in approximately the same length of time, the atmosphere, whether reducing or oxidizing, would not then greatly affect grain size. It was concluded, stated Mr. Gill, that apparently so long as the gases surrounding the specimen were not affecting either carburization or decarburization of the steel that apparently the gases themselves would not affect grain growth to the extent that some investigators had assumed, other than as they may affect the temperature and rate of heating.

Furnace Atmosphere Affects Structure

That the data published by Messrs. Phillips and Weldon will be very significant to the increasingly large number of metallurgists using the newer molybdenum tool steels, was the comment of R. M. Brick, research assistant, Yale university, New Haven, Conn., and Frank Garratt, vice president and technical director, Universal Steel Co., Bridgeville, Pa., in a joint written discussion. It now seems certain, they said, that oxygen and also water vapor, when present in the furnace atmosphere, affect the inner structure of molybdenum tool steels as well as contributing to the recognized "soft skin" formed on unprotected surfaces.

Some work was performed by Messrs. Brick and Garratt in an attempt to define the mechanism of the action of oxygen in increasing grain growth and lowering the incipient melting point. The steel used, MoTung, is similar to that employed by the authors except that a portion of the vanadium is replaced by a certain amount of tungsten. Rods of this material ¾-inch in diameter were hardened under reducing and oxidizing conditions. The time at hardening temperature was varied sufficiently to give three desired structures—normal fine grained, coarse grained and partially melted. Similar specimens of the usual 18-4-1 high speed steel were also prepared and studied for comparison. The outer surfaces of the specimens were ground away to the point where the rod had its representative structure. Complete gas analyses then were made in duplicate.

According to the investigators, the oxygen contents of the steels were nearly identical and seemed to indicate that oxygen does not remain in the steel nor apparently does it participate in the eutectic formed in over heated MoTung. The mechanism of the effect of oxygen and water vapor in the furnace atmosphere on grain growth in the eutectic melting remains obscure.

Dispose of Self Heating

In their work, at least, Messrs. Phillips and Weldon seem to have disposed of the suggestion of "self heating" being responsible or of the possibility of oxygen affecting the rate of heat transfer. The fact that at fairly low hardening temperature, eutectic melting will take place in an oxidizing atmosphere and not in a reducing atmosphere strongly suggested to Messrs Brick and Garratt a change in composition of the steel to a position above the solidus line. This shift in composition apparently is not accompanied by an oxygen pick up. The most logical surmise would be that there is a loss in carbon, by the diffusion of monatomic oxygen through the steel, the formation of CO and the subsequent diffusion out of the steel of CO.

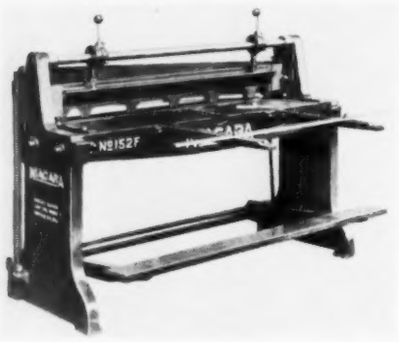
The effect of water vapor on this basis may be explained by assuming that the reactive surface of the steel dissociates the water vapor, supplying more monatomic oxygen which would quickly enter the steel while the hydrogen would be removed by convection currents. No completely reliable data are at hand to disprove this suggestion, stated Messrs. Brick and Garratt.

In concluding, they stated that the Universal Steel Co. found that a 2½-inch billet of MoTung held 10 hours at 2100 degrees Fahr. lost only 0.005 per cent carbon (an average of 12 analyses), but this temperature is lower than those employed for hardening, the composition of the furnace atmosphere was not known definitely, and the analyses were made near the center of a thick section.

NEW EQUIPMENT

Foot-Operated Shears—

Niagara Machine & Tool Works, 637-697 Northland avenue, Buffalo, announces a complete new line of series F foot-operated squaring shears for cutting 16-gage metal. A new feature is the steel holddown, operated manually by self-locking eccentrics and capable of exerting heavy pressure on the sheet to maintain cutting accuracy. Another new idea is the steel crosshead which provides a rigid backing for the knife, at the same time holding



Niagara series F foot-operated squaring shears

weight to a minimum. It moves in flat ways with adjustable gibs. On the 96 and 120-inch shears a patented parallel screw adjustable back gage is furnished. This device is readily adjusted from either end of the machine and maintains parallel alignment with the knives throughout the entire range. A new arrangement of the treadle mechanism results in easier operation and improved cutting action. Series F units are available in cutting lengths from 36 to 72 inches for 16 gage. Foot-operated shears in 8 and 10-foot cutting lengths also are available for 18 gage.

◆ ◆ ◆

Engine-Driven Arc Welder—

J. D. Adams Co., Indianapolis, is bringing out a new engine-driven arc welder, shown herewith. By pushing a button on his electrode holder the operator can stop the engine between welds and thus reduce operating costs. Two sizes are available—200

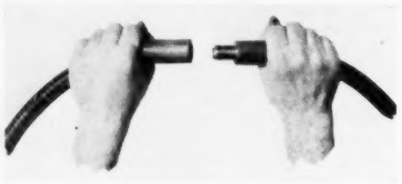
Adams engine-driven arc welder embodies remote start and stop engine control

and 300-ampere, standard NEMA 40-volt rating. An infinite number of steps is obtained throughout the entire welding range by simply turning a handwheel, thus moving the main and auxiliary brushes. Extremely wide welding range permits utilization of these machines on thin gage metal, heavy plate or structural sections with all types of electrodes.

◆ ◆ ◆

Cable Connector—

Lincoln Electric Co., Cleveland, is offering a new type of quick-detachable connector designed for use in connecting welding or electrode cable. It locks in position and cannot work loose nor be accidentally pulled apart. In operating the con-



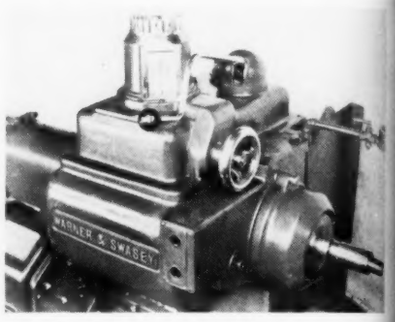
Lincoln quick detachable connector for welding cable

nector, shown herewith, the plug is inserted in the jack and a twist of the wrist locks the connection. To disconnect, the procedure is reversed. Protection against grounding is assured by insulating sleeves.

◆ ◆ ◆

Cutting Speed Preselector—

Warner & Swasey Co., Cleveland, is announcing a cutting speed preselector for machine tools. The development, shown herewith, provides single lever control not only for shifting the gears but also for actuating the forward and reverse clutch. It also furnishes a built-in cutting speed selector and a speed sequence indicator. Selection of the proper cutting speeds requires merely rotating a drum until the proper feet per minute appear opposite the diameter to be machined. The speed sequence indicator is incorporated in the form of a castellated drum on top of the device into the slots of which numerals are in-



Cutting speed preselector developed by Warner & Swasey Co.

serted to indicate the several speeds required on the job consecutively. The operator merely rotates the handwheel until No. 1 is in front, pulls the lever, and then while the machine is in operation, he brings No. 2 forward and when the machine is finished with cut No. 1, he pulls the lever and thereby has the machine ready for cut No. 2.

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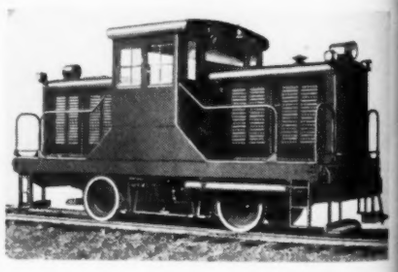
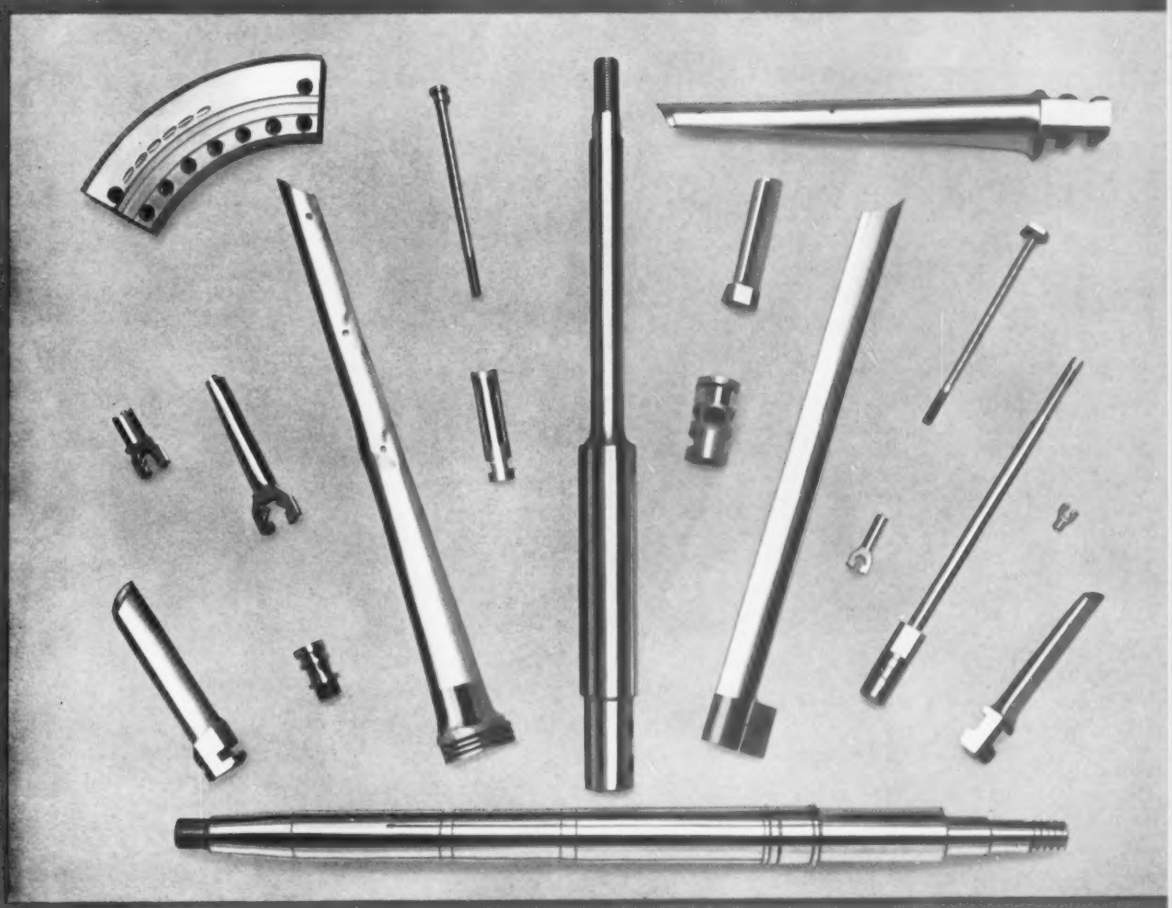
Diesel-Electric Locomotives—

Euclid Road Machinery Co., Cleveland, recently developed stand-



Euclid diesel-electric locomotive has industrial use

BETHADUR AND BETHALON



STAINLESS STEELS BY BETHLEHEM

INDUSTRY today is stainless-steel minded. Stainless steels are constantly being assigned to new tasks calling for superlative resistance to heat, acids, and the ravages of the atmosphere.

Whatever the contemplated use, there is a grade of Bethadur or of Bethalon that will exactly fill the bill, in respect to both the needed working qualities and the particular kind of corrosion involved. Developed in Bethlehem Steel Company laboratories, these great steels cover the entire range of materials commonly referred to as stainless steels and irons.

Bethalon has become extensively known as a free-machining stainless steel. Equally outstanding in its own field is each of the nine grades of Bethadur. Brief descriptions of these steels appear on the following page. For detailed information on their properties and working send for booklet on Bethadur and Bethalon.

Bethlehem also makes the lower-chromium type steels of the stainless group, containing 4 to 6 per cent chromium with various additions of molybdenum, tungsten and vanadium.

Prominent among Bethlehem Stainless Steel Products are the following: . . . . Bars, hot-rolled, cold-drawn, centerless-ground and polished. A specialty is made of highly polished stainless-steel bars particularly adapted to the pump and valve industry . . . . Plates and angles . . . . Forgings, drop and hammer . . . . Bolts and nuts.

BETHLEHEM STEEL

BETHADUR 1

BETHADUR 1 is of the standard stainless-iron type. It possesses excellent corrosion-resisting properties in either the heat-treated or annealed condition. It is readily forged, can be machined without great difficulty, and may be heat-treated to secure high physical properties.

BETHADUR 2

BETHADUR 2 is the type commonly known as 18-8 stainless steel. It finds application where extreme resistance to atmospheric corrosion is required, particularly in ornamental parts which must retain their lustre over long periods of time without frequent cleaning and polishing. It is non-magnetic.

BETHADUR 3

BETHADUR 3 is primarily an acid-resisting steel and shows very little loss in weight when subjected to sulphuric or hydrochloric acid in mild concentrations. Therefore, it finds particularly wide use in chemical-plant apparatus, pickling equipment, and similar applications.

BETHADUR 4

BETHADUR 4 is similar to Bethadur 1, in that it requires no heat-treatment to bring out its maximum corrosion-resisting properties. Bethadur 4 is suitable for applications where high resistance to atmospheric attack is required, but where physical properties are relatively unimportant.

Bethadur 4 is particularly recommended for exterior trim, ornamental objects, and all other purposes not requiring the exceptionally high corrosion-resistance of Bethadur 2.

Bethadur 4 is the most malleable of all straight chromium-iron alloys. This property makes it particularly fitted for purposes where drastic cold work is encountered.

Bethadur 4 is an excellent heat-resisting steel. Under continuous service it will resist oxidation up to about 1200 deg. F., and will stand temperatures up to 1600 deg. F., for short periods of time without scaling.

BETHADUR 5

BETHADUR 5, with unusually high chromium content, is intended for use where exceptional corrosion-resistance is required, or dilute acids encountered. It is extensively used in the nitric-acid industry.

Bethadur 5 is sometimes used as a heat-resisting steel, though the higher carbon content of Bethadur 9 makes the latter alloy more desirable from a strength standpoint.

BETHADUR 6

BETHADUR 6 is the hardening grade of corrosion-resisting steel, sometimes called the cutlery grade. It is used in the manufacture of non-corroding parts that must be hardened.

BETHADUR 7

BETHADUR 7 has a high carbon content, making it suitable for parts in which a higher degree of hardness is needed. It is commonly used where hardness or abrasion-resistance is required in the presence of steam, water, salt water, mine water, oil and oil products.

Where extreme hardness is required the still-higher carbon Bethadur 8 should be used.

BETHADUR 8

WITH Bethadur 8 a maximum Rockwell "C" scale hardness of 60 can be obtained when the steel is quenched at temperatures in excess of 1850 deg. F. Other characteristics are the same as those of Bethadur 7.

BETHADUR 9

WHILE Bethadur 9, because of its high chromium content, is a corrosion-resisting steel, it is primarily intended for use in parts subjected to high temperatures.

Temperatures as high as 2100 deg. F. do not oxidize or scale the surface of Bethadur 9.

BETHALON

BETHALON A

BETHALON A, while easy-machining, possesses all of the excellent corrosion-resisting properties of straight carbon-chromium irons.

Bethalon A can be turned, drilled, bored or threaded as easily as ordinary screw stock, with the same tool set-up and the same feed, speed, and depth of cut. Excellent threads can be cut at 150 to 175 surface ft. per min.; it can be smooth-turned at 200 surface ft. per min.

BETHALON B

BETHALON B possesses corrosion-resisting properties equal to those of Bethadur 2, and is recommended for all uses where the rapid performance of intricate machining operations is important.

Bethalon B is not quite as machinable as Bethalon A, and must be machined at a somewhat lower speed than screw stock, though approximately twice the cutting speeds of standard 18-8 stainless can be used. The cutting speed is to some extent dependent on the type of screw-machine used, but speeds of from 80 to 90 surface ft. per min. can be maintained without the necessity for too frequent regrinding of tools.

Bethlehem District Offices: Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Kansas City, Milwaukee, New York, Philadelphia, Pittsburgh, San Antonio, St. Louis, St. Paul, Washington, Wilkes-Barre, York. *Pacific Coast Distributor:* Pacific Coast Steel Corp., San Francisco, Los Angeles, Seattle, Portland, Salt Lake City, Honolulu. *Export Distributor:* Bethlehem Steel Export Corp., New York.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

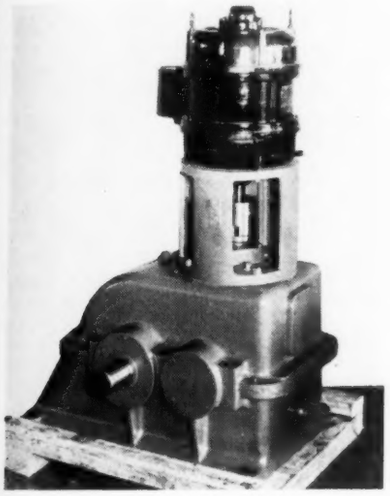
GENERAL OFFICES: BETHLEHEM, PA.

ardized diesel-electric locomotives for light railroad switching and industrial plant transportation. They are built in four-wheel units of from 35 to 55 tons weight and may be operated singly or in multiples of two by one engineer from either cab. Maximum tractive efforts available at starting range from 21,000 pounds for the 35-ton single unit to 66,000 pounds for the multiple 110-ton locomotive made up of two 55-ton units. For switching service, maximum speeds available under light load range from 22 to 26 miles per hour.

♦ ♦ ♦

Speed Reducer—

D. O. James Mfg. Co., 1114 West Monroe street, Chicago, is building a new type of speed reducer that consists of a combination of spiral bevel gears and continuous tooth herringbone gears. The motor is mounted on the top as shown herewith, providing a horizontal drive that occupies a minimum amount of floor space. A complete range of sizes with horsepowers from 1 to 200 and ratios from 8 to 1 to 45 to 1 and higher are available.



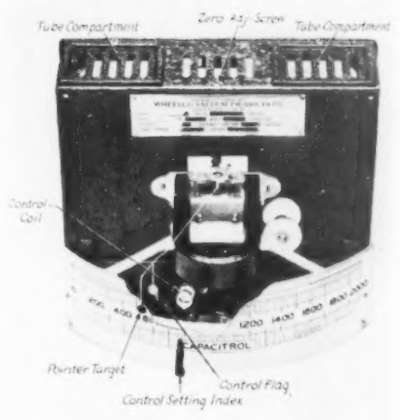
James speed reducer designed to save floor space

♦ ♦ ♦

Temperature Control—

Thermo Control Devices Inc., 1112 North Milwaukee avenue, Chicago, is introducing a new type of temperature control, known as the Wheelco system, for which it is the sole distributor. A feature of this equipment is that an electrical system, with the aid of a vacuum tube, performs the operation ordinarily accomplished by mechanical means.

Among the controls offered are an indicating control pyrometer, known as the Wheelco Capacitrol, and the Wheelco Limitrol, an automatic temperature limit cut out. The latter is designed to operate with any present auxiliary or relay means of control in use and can be adapted to indicate temperatures between zero and 3000 degrees Fahr. An indicator is set at the limit of temperature desired. When the temperature in the oven or furnace reaches this limit, the Limitrol signals a warning by light or bell, or both, and shuts off the furnace or oven. The device also is furnished with an automatic switch that will handle up to 39 thermocouples. With this type the temperature at one thermocouple is indicated every ten seconds.

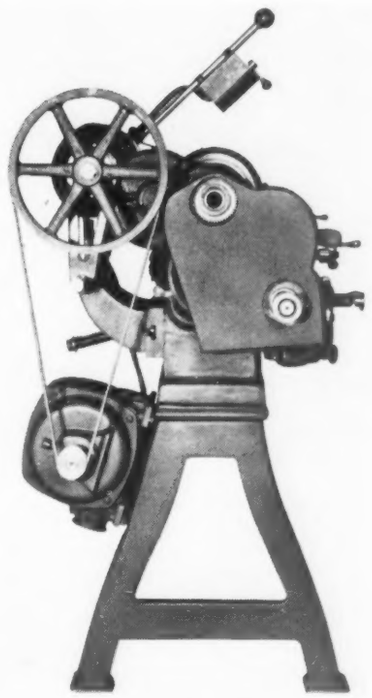


Temperature control unit introduced by Thermo Control Devices Inc., employs new operating principle

♦ ♦ ♦

Motor Drive Attachment—

Sebastian Lathe Co., Cincinnati, is bringing out a motor drive attachment to motorize cone head lathes. Features include a convenient lever to release spring tension to change belt speed. The motor can be mounted on the lathe leg or on the floor immediately under the lathe at the rear.

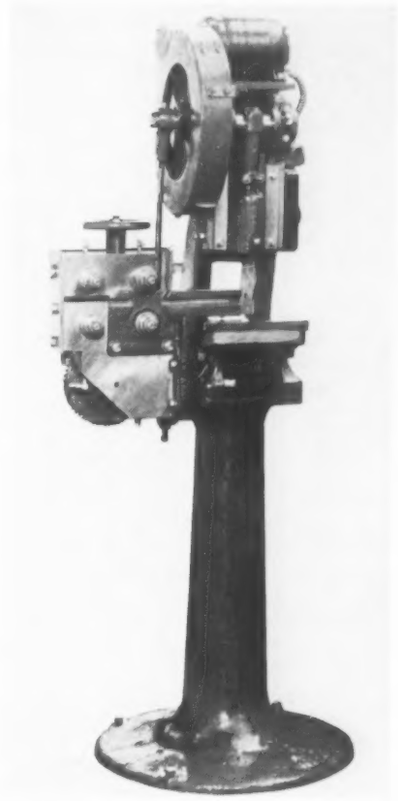


Sebastian attachment motorizes cone head lathes

♦ ♦ ♦

High-Speed Automatic Press—

E. W. Bliss Co., 1420 Hastings street, Toledo, O., is bringing out a self-contained high-speed automatic press, illustrated herewith. To permit accessibility and save floor space the unit is mounted on a pedestal of convenient height. A ½ horsepower motor drives the flywheel at a speed to give 700 strokes per minute. The automatic feature is obtained by a special type of roll feed mounted on the left end of the bolster. Feeding mechanism of the rolls is actuated by a bellcrank which has a screw adjustment to give a variation in the amount of feed from 0 to 1 inch.



Bliss self-contained automatic high production press

♦ ♦ ♦

Circuit Breakers—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., is marketing enclosed type 15 to 50-ampere circuit breakers for automatic fuseless protection and control for lighting circuits, single-phase motor circuits, etc. Automatic quick-break overcurrent operation is accomplished with inverse time lag by means of thermally actuated bimetals.

New Trade Publications

Contactors—General Electric Co., Schenectady, N. Y. Bulletin No. 2227 on its 300-ampere D. C. contactor, with illustrations and data.

Grinding Spindle Bearing—S. K. F. Industries Inc., Philadelphia. Bulletin No. 230, on a new mounting for grinding spindles, lathes and other tools.

Electric Tools—Chicago Pneumatic Tool Co., 6 East Forty-fourth street, New York. Bulletin No. 899, on its line of electrical tools, with illustrations and specifications.

Motor Starters—Lincoln Electric Co., Cleveland. Bulletins on its across-the-line motor starters, XLA, XLB and XLBB, in various horsepowers, with illustrations and diagrams.

Condensation Return — Decatur Pump Co., Decatur, Ill. Bulletin No. 105, describing a small capacity condensation return unit, illustrated and with data table.

Ampco Metal — Ampco Metal Inc., Milwaukee. A leaflet, engineering data sheet No. 20, devoted to description of bronze parts in heavy construction equipment.

Lubrication — Texas Co., 135 East Forty-second street, New York. The October issue of its regular series, devoted to problems of lubrication of electric refrigeration.

Elevating Graders — Caterpillar Tractor Co., Peoria, Ill. A booklet describing in detail its elevating graders for economical handling of dirt in grading, thoroughly illustrated.

Graphic KVA Meter—Esterline-Angus Co., Indianapolis. Bulletin No. 735, on its new graphic meter for power factor record, with illustrations of construction.

Induction Motors—Reliance Electric & Engineering Co., Cleveland. Bulletins No. 118 and 119 on its induction motors with squirrel-cage frames; illustrated.

Vertical Turret Lathes — Bullard Co., Bridgeport, Conn. A bulletin on its vertical turret lathe, with detailed illustrated description and standard tool equipment.

Nails and Wire—Bethlehem Steel Co., Bethlehem, Pa. Catalog W-3, 72 pages, pocket size, describing types of nails, wire, wire fence and fence materials, with table sand other data.

Welders—Air Reduction Sales Co., 60 East Forty-second street, New York. A bulletin on its Wilson arc welding machines with illustrations and data tables.

Electric Furnace—Harold E. Trent Co., 618 North Fifty-fourth street, Philadelphia. Leaflet TE 20 on its pot and trough type electric furnaces, with illustrations and data.

Mixers — Read Machinery Co. Inc., York, Pa. A folder on laboratory and production mixers for heavy plastics, doughy masses and products of high viscosity, light mixing of oils, paints and inks and of acids and dangerous chemicals.

Leather Belting—Graton & Knight Co., Worcester, Mass. A performance book containing experiences from actual case studies, giving figures on savings from use of its belts.

Galvanized Sheets—Superior Sheet Steel Co., Canton, O. A bulletin on its galvannealed steel sheets, describing their qualities and illustrating a wide variety of uses to which they are put.

Pneumatic Casters — Saginaw Stamping & Tool Co., Saginaw, Mich. A leaflet devoted to its line of pneumatic wheel casters for industrial trucks as a means of saving; data tables are included.

Formed Metal Plumbing Ware—American Rolling Mill Co., Middletown, O. A leaflet on its formed metal plumbing ware, stamped from sheet steel, which eliminates excess weight without loss of strength.

Industrial Tires — B. F. Goodrich Co., Akron, O. A handbook on rubber tires for industrial tractors and trucks with results of tests of tractive power required and wear on floors by steel and by rubber tires.

Duo Metals—Latrobe Electric Steel Co., Latrobe, Pa. A bulletin on clad metals produced by this company's process, with photomicrographs of welds by electrochemical method and advantages of the resulting product.

Rolled Steel—Whitehead & Kales, Detroit. A booklet containing information on arc-welded rolled steel, showing views of various types of work, and giving practical hints on using rolled steel for machine bases.

Potentiometer Controllers—Foxboro Co., Foxboro, Mass. Bulletin No. 202, on its potentiometer controllers for industrial temperatures, featuring a new type drive unit which lowers cost, wiring diagrams and data.

Friction Materials—Johns-Manville, 22 East Fortieth street, New York. A brochure catalog of industrial friction materiols, flexible and rigid; describes woven compressed, folded compressed, friction block and molded varieties.

Nickel Bearing Alloys—International Nickel Co. Inc., 67 Wall street, New York. A leaflet on the use of nickel bearing alloys in oil refineries, showing the wide range of such alloys available for petroleum refinery equipment.

Engine-Type Generators — Allis-Chalmers Mfg. Co., Milwaukee. Bulletin No. 1153-A, describing its engine type alternating current generator, with illustrations showing details of construction and application, with characteristic installations.

Pumps—Worthington Pump & Machinery Corp., Harrison, N. J. Three bulletins: W-450-B13, on its deep well turbine pumps, types Q and QA; L-611-B3A, on steam booster compressors; W-321-B6, on its monobloc condensate return units.

Electric Fuse—Schweitzer & Conrad Inc., 4435 Ravenswood avenue, Chicago. Bulletin No. 200C on its high-capacity type C fuse for substation and industrial service, describing construction, application and service, with dimension data and ratings.

Pressure Vessels — Combustion Engineering Co. Inc., 200 Madison avenue, New York. A four-page bulletin on a variety of pressure vessels and fabricated plate work for process industries, including rotary digesters, stripping columns, bubble towers and autoclaves, both riveted and welded.

Boilers—International Boiler Works Co., East Stroudsburg, Pa. A handsome booklet, souvenir of business relations to those intimately acquainted with the company and a source of information those not so well acquainted; describes the plant and methods, products, aims and accomplishments.

Conveyors—Standard Conveyor Co., North St. Paul, Minn. A bulletin showing comprehensively its varied line of conveyors with detailed description and characteristic installations; another bulletin is devoted to gravity roller conveyors and a third to pneumatic tube systems.

Valves—Consolidated Ashcroft Hancock Co. Inc., Bridgeport, Conn. A bulletin on its straight-line control of flow, with micrometer adjustment, provided in its flocontrol valve; another on its new union bonnet bronze valve, with superhard stainless steel trim, designed to resist steam cutting and wire drawing.

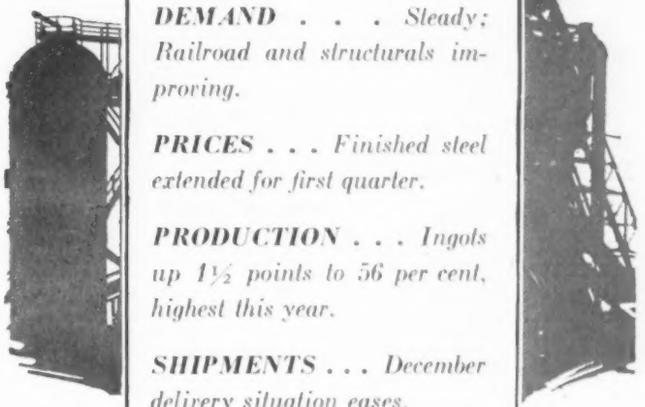
Alloy Iron—Bethlehem Steel Co., Bethlehem, Pa. A 24-page illustrated booklet, No. 54-B, on its silvery Mayari alloy iron, containing pertinent facts for foundry and other users of silvery Mayari, a natural nickel-chromium iron with high silicon content; of use to foundry products users interested in alloy iron for high-test machinable castings.

Carboloy Tools—Carboloy Co. Inc. Detroit Booklet No. A-23, describing 55 applications of its tools by 33 machine tool builders at the recent machine tool show at Cleveland, in demonstrating their new machines; a cross section of machines, operations and materials; speeds, feeds, depth of cut, floor to floor time and other data are given in each instance.

Automatic Controls—Thermo Control Devices Inc., 1112 North Milwaukee avenue, Chicago. Four bulletins describing a new system of automatic control for regulation of temperatures flows, etc., covering temperature controls and limit devices, indicating pyrometers and milliammeters, microammeters, diesel engine pyrometers, thermocouple switches, relays, potentiometer pyrometers, portable pyrometers, thermocouples and temperature signalling devices.

Steel Output Rises, Without Price Advance

Rate 56, Year's New High; Railroad and Structural Steel More Active



MARKET IN TABLOID

DEMAND . . . *Steady; Railroad and structurals improving.*

PRICES . . . *Finished steel extended for first quarter.*

PRODUCTION . . . *Ingots up 1½ points to 56 per cent, highest this year.*

SHIPMENTS . . . *December delivery situation eases.*

PRESSURE for delivery of finished steel before Jan. 1 has relaxed as the initial consequence of steelmakers' decision last week not to raise prices for first quarter.

This decision came as a surprise even to district sales managers who had booked some speculative orders on the general assumption of an advance. A considerable portion of the tonnage, except in sheets and strip required by automobile manufacturers, may be canceled or deferred.

One explanation offered for the price policy finally adopted by leading interests is that some mills in efforts to accumulate heavy backlogs overstepped Jan. 1 as a delivery deadline and engaged tonnage not intended for, or possible of shipment until first quarter, thus tending to make ineffective a general increase.

The decision favors the small buyer whose financial position does not permit him to stock up. Some steelmakers consider the action merely as a postponement of an advance which they feel sure must come some time in the first quarter. On the other hand, the recent increase of $2 a ton on semifinished steel will not be tested until January, and nonintegrated mills already are pushing hard for a reduction.

The only price changes to develop out of the wide range that were discussed are an advance of $4 a ton on track spikes and $1 on track bolts. Beehive furnace coke has been increased 10 cents a ton, and the foundry grade reduced 10 cents.

At 56 per cent, steelworks operations last week were 1½ points up from the preceding week and highest this year. November as a whole averaged about 54.3 per cent, compared with 52.3 in February the previous high this year, and 28.13 per cent in November, 1934. Actual ingot production for 11 months is approximately 28 per cent over the first 11 last year.

Steel has been shipped from the mills at a fairly even rate throughout the year, one of the notable features of 1935; there having been no "poor" months as classified by steelmakers. With price uncertainties removed, December now promises to continue this record for steadiness.

Full finished sheet mill operations gained several points to 75 per cent last week, despite the holiday influences which lowered automobile production about 11,700 units to 83,000.

Union Pacific's purchase of 70,000 tons of rails last week was the largest single rail order since Pennsylvania ordered 100,000 tons in December, 1933. The Union Pacific also closed for 30,000 tons of track accessories, while Chicago Great Western awarded 15,000 tons of rails and fastenings. Southern Pacific is planning to spend $1,000,000 on air conditioning equipment.

Not only are the prospects for increased railroad equipment considered good for the early months of next year, but the government also has released a flood of public works projects, including grade eliminations, which is taxing the capacity of steel fabricators' estimating departments. A federal grant insures early resumption of Chicago's outer drive development, requiring 22,000 tons of structural shapes and reinforcing bars. Shape awards for the week totaled 21,229 tons, compared with 12,009 in the preceding week.

After advancing four consecutive weeks, scrap prices last week tended to stabilize, STEEL's scrap composite being unchanged at $13.12. Pennsylvania railroad is taking bids on 10,000 tons of scrap axles, frequently used as forging stock. Some pig iron melters who previously placed large tonnages for delivery before Jan. 1, when the $1 advance goes in effect, have increased their orders.

Steelworks operations in the Chicago district last week rose 1½ points to 62½ per cent; Cleveland 2 to 82; Buffalo 3 to 40; Birmingham 9½ to 56; Youngstown 2 to 58. Pittsburgh was down 1 to 45; New England 3 to 90, and others unchanged.

STEEL's iron and steel price composite has advanced 11 cents to $33.28, while the finished index remains $53.70.

COMPOSITE MARKET AVERAGES

	Nov. 30	Nov. 23	Nov. 16	One Month Ago Oct., 1935	Three Months Ago Aug., 1935	One Year Ago Nov., 1934	Five Years Ago Nov., 1930
Iron and Steel	$33.28	$33.17	$33.16	$32.84	$32.68	$32.15	$31.95
Finished Steel	53.70	53.70	53.70	53.70	54.02	54.00	49.62
Steelorks Scrap	13.12	13.12	12.96	12.72	12.05	9.82	11.17

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

A COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

	Nov. 30, 1935	Oct. 1935	Aug. 1935	Nov. 1934
Finished Material				
Steel bars, Pittsburgh	1.85c	1.85c	1.80c	1.80c
Steel bars, Chicago	1.90	1.90	1.85	1.85
Steel bars, Philadelphia	2.16	2.16	2.11	2.09
Iron bars, Terre Haute, Ind.	1.75	1.75	1.75	1.75
Shapes, Pittsburgh	1.80	1.80	1.80	1.80
Shapes, Philadelphia	2.01½	2.01½	2.01½	2.00½
Shapes, Chicago	1.85	1.85	1.85	1.85
Tank plates, Pittsburgh	1.80	1.80	1.80	1.80
Tank plates, Philadelphia	2.00	1.99	1.99	1.98½
Tank plates, Chicago	1.85	1.85	1.85	1.85
Sheets, No. 10, hot rolled, Pitts.	1.85	1.85	1.85	1.85
Sheets, No. 24, hot ann., Pitts.	2.40	2.40	2.40	2.40
Sheets, No. 24, galvan., Pitts.	3.10	3.10	3.10	3.10
Sheets, No. 10, hot rolled, Gary	1.95	1.95	1.95	1.95
Sheets, No. 24, hot anneal., Gary	2.55	2.55	2.55	2.55
Sheets, No. 24, galvan., Gary	3.20	3.20	3.20	3.20
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Tin plate, per base box, Pitts.	5.25	5.25	5.25	5.25
Wire nails, Pittsburgh	2.40	2.40	2.55	2.60
Semifinished Material				
Sheet bars, open-hearth, Youngs	$30.00	$28.00	$28.00	$28.00
Sheet bars, open-hearth, Pitts.	30.00	28.00	28.00	28.00
Billets, open-hearth, Pittsburgh	29.00	27.00	27.00	27.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00

	Nov. 30, 1935	Oct. 1935	Aug. 1935	Nov. 1934
Pig Iron				
Bessemer, del. Pittsburgh	20.81	$19.81	$19.81	$19.76
Basic, Valley	19.00	18.00	18.00	18.00
Basic, eastern, del. eastern Pa.	20.81	19.81	19.81	19.76
No. 2 foundry, del. Pittsburgh	20.31	19.31	19.31	19.26
No. 2 foundry, Chicago	19.50	18.75	18.50	18.50
Southern No. 2, Birmingham	15.50	14.50	14.50	14.50
No. 2X eastern, del. Philadelphia	21.68	20.68	20.68	20.63
Malleable, Valley	19.50	18.50	18.50	18.50
Malleable, Chicago	19.50	18.75	18.50	18.50
Lake Superior charcoal del. Chi.	25.25	24.90	24.25	24.04
Ferromanganese, del. Pittsburgh	90.13	90.13	90.13	89.79
Gray forge, del. Pittsburgh	19.67	18.67	18.67	18.63
Scrap				
Heavy melting steel, Pittsburgh	$13.75	$13.65	$13.25	$11.15
Heavy melt. steel, No. 2, east. Pa.	11.00	11.00	10.50	8.35
Heavy melting steel, Chicago	13.75	12.50	12.35	9.10
Rails for rolling, Chicago	14.75	14.00	13.65	10.35
Railroad steel specialties, Chicago	14.25	13.50	13.55	10.05
Coke				
Connellsville, furnace, ovens	$3.65	$3.55	$3.25	$3.60
Connellsville, foundry, ovens	4.25	4.35	4.00	4.60
Chicago, by-product foundry, del.	9.75	9.75	9.25	9.25

Steel, Iron, Raw Material, Fuel and Metals Prices

Except when otherwise designated, prices are base, f.o.b. cars. Asterisk denotes price change this week

Sheet Steel

Hot Rolled No. 10, 24-48 in.

Pittsburgh	1.85c
Gary	1.95c
Chicago, delivered	1.98c
New York, del.	2.20c
Philadelphia, del.	2.16c
Birmingham	2.00c
St. Louis, del.	2.18c
Pacific ports, f.o.b. cars, dock	2.40c

Hot Rolled Annealed No. 24

Pittsburgh	2.40c
Gary	2.50c
Chicago, delivered	2.53c
Detroit, delivered	2.60c
New York, del.	2.75c
Philadelphia, del.	2.71c
Birmingham	2.55c
St. Louis, del.	2.72c
Pacific ports, f.o.b. cars, dock	3.05c

Galvanized No. 24

Pittsburgh	3.10c
Gary	3.20c
Chicago, delivered	3.23c
Philadelphia, del.	3.41c
New York, del.	3.45c
Birmingham	3.25c
St. Louis, del.	3.43c
Pacific ports, f.o.b. cars, dock	3.70c

Tin Mill Black No. 28

Pittsburgh	2.75c
Gary	2.85c
St. Louis, delivered	3.08c

Cold Rolled No. 10

Pittsburgh	2.50c
Gary	2.60c
Detroit, delivered	2.70c
Philadelphia, del.	2.81c
New York, del.	2.85c
Pacific ports, f.o.b. cars, dock	3.10c

Cold Rolled No. 20

Pittsburgh	2.95c
Gary	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.26c
New York, del.	3.30c

Enameling Sheets

Pittsburgh, No. 10	2.50c
Pittsburgh, No. 20	3.10c
Gary, No. 10	2.60c
Gary, No. 20	3.20c

Tin and Terne Plate

Gary base, 10 cents higher.

Tin plate, coke base (box) Pittsburgh	$5.25
Do., waste-waste	2.75c
Do., strips	2.50c
Long ternes, No. 24 unassorted, Pitts.	3.40c
Do., Gary	3.50c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	23.00	24.00
Plates	26.00	28.00
Sheets	33.00	35.00
Hot strip	20.75	22.75
Cold strip	27.00	29.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	17.00	18.50	21.00	26.00
Plates	20.00	21.50	24.00	29.00
Sheets	25.00	28.00	31.00	35.00
Hot strip	15.75	16.75	21.75	26.75
Cold stp.	20.50	22.00	27.00	35.00

Steel Plates

Pittsburgh	1.80c
New York, del.	2.09c
Philadelphia, del.	1.99c
Boston, delivered	2.22c
Buffalo, delivered	2.05c
Chicago or Gary	1.85c
Cleveland, del.	1.99½c
Birmingham	1.95c
Coatesville, base	1.90c
Sparrows Pt., base	1.90c
Pacific ports, f.o.b. cars, dock	2.35c
St. Louis, delivered	2.08c

Structural Shapes

Pittsburgh	1.80c
Philadelphia, del.	2.01½c
New York, del.	2.06½c
Boston, delivered	2.20½c
Bethlehem	1.90c
Chicago	1.85c
Cleveland, del.	2.00c
Buffalo	1.90c
Gulf Ports	2.20c
Birmingham	1.95c
Pacific ports, f.o.b. cars, dock	2.35c

Bars

Soft Steel
(Base, 5 to 25 tons)

Pittsburgh	1.85c
Chicago or Gary	1.90c
Duluth	2.00c
Birmingham	2.00c
Cleveland	1.90c
Buffalo	1.95c
Detroit, delivered	2.00c
Pacific ports, f.o.b. cars, dock	2.40c
Philadelphia, del.	2.16c
Boston, delivered	2.27c
New York, del.	2.20c
Pitts., forg. qual.	2.10c

Rail Steel
To Manufacturing Trade

Pittsburgh	1.70c
Chicago or Gary	1.75c
Moline, Ill.	1.75c
Cleveland	1.75c
Buffalo	1.80c

Iron

Troy, N. Y.	1.70c
Terre Haute, Ind.	1.75c
Chicago	1.80c
Philadelphia	2.06c
Pittsburgh, refined	2.75-7.50c

Reinforcing

New billet, straight lengths, quoted by distributors.

Pittsburgh	2.05c
Chicago, Gary, Buffalo, Cleve., Birm., Young	2.10c
Gulf ports	2.45c
Pacific coast ports f.o.b. cars dock	2.45c
Philadelphia, del.	2.36c

Rail steel, straight lengths, quoted by distributors

Pittsburgh	1.90c
Chicago, Buffalo, Cleveland, Birm., Young.	1.95c
Gulf ports	2.30c

Wire Products

(Prices apply to straight carloads; less than straight carloads take trade quantity extras; 10% dis. on nail extras on straight or mixed carloads to one consignee.)

Base Pitts.-Cleve. 100 lb. keg.

Standard wire nails	$2.40
Cement coated nails	2.40
Galvanized nails, 15 gage and coarser	4.40
do. finer than 15 gage	4.90

(Per pound)

Polished staples	3.10c
Galvanized fence staples	3.35c
Barbed wire, galv.	2.80c
Annealed fence wire	2.45c
Galvanized fence wire	2.80c
Woven wire fencing (base column, c.l.)	$58.00

To Manufacturing Trade

Plain wire, 6-9 gage	2.30c

Anderson, Ind. (merchant products only) and Chicago up $1; Duluth up $2; Birmingham up $3.

Spring wire, Pittsburgh or Cleveland	2.90c

Do., Chicago up $1, Worcester, $2.

Cold-Finished Carbon Bars and Shafting

Base, Pitts., one size, shape, grade, shipment at one time to one destination

10,000 to 19,999 lbs.	1.95c
20,000 to 59,999 lbs.	1.90c
60,000 to 99,999 lbs.	1.85c
100,000 lbs. and over	1.82½c

Gary, Ind., Cleve., Chi., up 5c; Buffalo, up 10c; Detroit, up 20c; eastern Michigan, up 25c.

Alloy Steel Bars (Hot)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem 2.45c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.25	3100	0.55
2100	0.55	3200	1.35
2300	1.50	3300	3.80
2500	2.25	3400	3.20

4100 0.15 to 0.25 Mo. 0.50
4600 0.20 to 0.30 Mo. 1.25-1.75 Ni. 1.05
5100 0.80-1.10 Cr. 0.45
5100 Cr. spring base
6100 bars 1.20
6100 spring 0.70
Cr., Ni., Van. 1.50
Carbon Van. 0.95
9250 carbon base plus extras

Piling

Pittsburgh	2.15c
Chicago, Buffalo	2.25c

Strip and Hoops

Hot strip to 23⅛-in.

Pittsburgh	1.85c
Chicago or Gary	1.95c
Birmingham base	2.00c
Detroit, delivered	2.05c
Philadelphia, del.	2.16c
New York, del.	2.20c
Cooperage hoop, Pittsburgh	1.95c
Chicago	2.05c
Cold-strip strip, Pitts., Cleve.	2.60c
Worcester, Mass.	2.80c

Rails, Track Material

(Gross Tons)

Standard rails, mill	$36.37½
Relay rails, Pitts. 20-45 lbs.	$28.00
45-50 lbs.	$25.00
50-60 lbs.	$26.00
70-75 lbs.	$24.50
80-90 lbs.	$26.00
100 lbs.	$27.00
Light rails, billet qual. Pitts., Chi.	$35.00
Do., reroll, qual.	34.00
Angle bars, billet, Gary, Ind., So. Chi.	2.55c
Do., axle steel	2.10c
*Spikes, R. R. base	2.60c
*Track bolts, base	3.60c
Tie plates, base	1.90c

Base, light rails 25 to 40 lbs.; 50 to 60 lbs. inclusive up $2; 16 and 20 lbs., up $1; 12 lbs. up $2; 8 and 10 lbs., up $5. Base railroad spikes 200 kegs or more; base tie plates 20 tons.

Bolts and Nuts

Pittsburgh, Cleveland, Birmingham, Chicago. Discounts to legitimate trade for all case lots, Dec. 1, 1932, lists, 10% extra for less full containers.

Carriage Bolts

All sizes, cut thread	75 off
Rolled thread, ½ x 6, smaller	75 off

Machine Bolts

All sizes, cut thread lag screws, plow bolts, Nos. 1-2-3-7 heads, tap bolts, blank bolts, stud bolts	75 off
Tire bolts	60 off
Stove bolts, 75 off in pkgs.; 83 off on 15,000 of 3-inch and shorter, or 5000 over 3-inch.	
Rolled thread machine, ½ x 6, smaller	75 off
Step bolts	70 off
Elevator bolts	70 off

Nuts

S.A.E. semifinished hex.; ½ to ⅞-inch	75 off
Do., ½ to 1-inch	75 off
Do., over 1-inch	70 off

Hexagon Cap Screws

Milled	80-10-10 off
Upset, 1-in., smaller	85 off

Square Head Set Screws

Upset, 1-in., smaller	75-10 off
Headless set screws	75 off

Rivets, Wrought Washers

Struc., c. l., Pittsburgh, Cleveland	2.90c
Struc., c. l., Chicago	3.00c
⅞-in. and smaller, Pitts., Chi., Cleve.	70 and 5 off
Wrought washers, Pitts., Chi., Phila., to jobbers & large nut, bolt mfrs.	$6.25 off

Cut Nails

Cut nails, Pitts.; (10% discount on size extras)	$2.75
Do. less carloads, 5 kegs or more no discount on size extras	$3.05
Do. under 5 kegs; no discount on size extras	$3.20

Pipe and Tubing

Base $200 net ton, expect on standard commercial seamless boiler tubes under 2 inches and cold drawn seamless tubing.

Welded Iron, Steel Pipe

Base discounts on steel pipe, Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less. Chicago, del. 2½ points less. Wrought pipe, Pittsburgh.

Butt Weld

In.	Steel Blk.	Steel Galv.
¼ and ⅜	53½	35
½	58½	47
¾	62	52
1—3	64	55
Iron		
½	31½	15
¾	36½	20½
1—1¼	39½	25½
2	41½	26

Lap Weld

	Steel	
2	60	51
2½—3	63	54
3½—6	65	56
7 and 8	64	54
9 and 10	63½	53½
Iron		
2	37	22½
2½—3½	38	25
4—8	40	28½

Line Pipe

	Steel
½, butt weld	57½
⅛-inch, butt weld	50½
¼—⅜, butt weld	52½
¾, butt weld	61
1—3, butt weld	63
2-inch, lap weld	59
2½—3, lap weld	62
3½—6, lap weld	64
7—8, lap weld	63
Iron	

⅛—1½ inch, black and galv. take 4 pts. over; 2½—6 inch 2 pts. over discounts for same sizes, standard pipe lists, 8—12-inch, no extra.

Boiler Tubes

C. L. Discounts, f.o.b. Pitts.

Lap Weld Steel		Charcoal Iron	
2—2¼	33	1¾	8
2½—2¾	40	2—2¼	13
3	47	2½—2¾	16
3¼—3½	50	3	17
4	52	3¼—3½	18
4½—5	42	4	20
		4½	21

In lots of a carload or more, above discounts subject to preferential of two 5% and one 7½% discount on steel and 10% on charcoal iron.

Lapwelded steel: 200 to 9999 pounds, ten points under base, one 5% and one 7½%. Under 2000 pounds 15 points under base, one 5% and one 7½%. Charcoal iron: 10,000 pounds to carloads, base less 5%; under 10,000 lbs., 2 points under base.

Seamless Boiler Tubes

Under date of May 15 in lots of 40,000 pounds or more for cold-drawn boiler tubes and in lots or 40,000 pounds or feet or more for hot-finished boiler tubes, revised prices are uoted for 55 cold-drawn boiler tube sizes ranging from ¼ to 6-inch outside diameter in 30 wall thicknesses, decimal equivalent from 0.035 to 1.000, on a dollars and cents basis per 100 feet and per pound. Less-carloads revised as of July 1, 1935, card.

Hot-finished carbon steel boiler tube prices also under date of May 15 range from 1 through 7 inches outside diameter, inclusive, and embrace 47 size classifications in 22 decimal wall thicknesses ranging from 0.109 to 1.000, prices also being on a lb. and 100 ft. basis.

Seamless Tubing

Cold drawn; f.o.b. mill disc.

100 ft. or 150 lbs.	32%
15,000 ft. or 22,500 lbs.	70%

Cast Iron Water Pipe

Class B Pipe—Per Net Ton

6-in. & over, Birm.	$39.00-40.00
4-in., Birmingham	42.00-43.00
4-in., Chicago	50.40-51.40
6 to 24-in. Chicago	47.40-48.40
6-in. & over, east. fdy.	43.00
Do., 4-in.	46.00

Class A pipe $3 over Class B.

Stnd. fitgs., Birm. base	$100.00

Semifinished Steel

Billets and Blooms

4 x 4-inch base; gross ton

Pitts., Chi., Cleve., and Youngstown	$29.00
Philadelphia	34.67
Duluth	31.00

Forging Billets

6 x 6 to 9 x 9-in., base

Pitts., Chi., Buff.	35.00
Forging, Duluth	37.00

Sheet Bars

Pitts., Cleve., Young., Chi., Buff., Canton, Sparrows Pt.	30.00

Slabs

Pitts., Chi., Cleve., Young.	29.00

Wire Rods

(Common; combination up $2)

Pitts., Cleveland	40.00
Chicago	41.00
Worcester, Mass.	42.00

Skelp

Pitts., Chi., Young., Buff., Coatesville, Sparrows Point	1.80c

Coke

Price Per Net Ton

Beehive Ovens

*Connellsville, fur.	$3.65- 3.75
*Connellsville, fdry.	4.25- 4.40
Connel., prem. fdry.	5.50- 5.75
New River fdry.	6.00
Wise county fdry.	4.45- 5.00
Wise county fur.	4.00- 4.50

By-Product Foundry

Newark, N. J., del.	9.20- 9.65
Chi., ov., outside del.	9.00
Chicago, del.	9.75
New England, del.	11.50
St. Louis, del.	10.00
Birmingham, ovens	6.00
Indianapolis, del.	9.40
Cincinnati, del.	9.50
Cleveland, del.	9.75
Buffalo, ovens	7.50- 8.00
Detroit, ov., out. del.	9.00
Philadelphia, del.	9.03

Coke By-Products

Per gallon, producers' plants.

	Tank lots	Spot
Pure and 90% benzol	18.00c	
Toluol	30.00c	
Solvent naphtha	30.00c	
Commercial xylol	30.00c	

Per lb. f.o.b. New York.

Phenol (200 lb. drums)	16.30c
Do. (100 lbs.)	17.30c

Eastern Plants, per lb.

Naphthalene flakes and balls, in bbls., to jobbers	6.75c

Per 100 lb. Atlantic seaboard

Sulphate of ammonia	$1.20

†Western prices, ½-cent up.

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25; 50c diff. for each 0.25 below 1.75. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$20.50	$21.00	$20.00	$21.50
Birdsboro, Pa.	20.50	21.00	20.00	21.50
*Birmingham, Ala., southern del.	15.50	15.50	14.50	21.00
Buffalo	19.50	20.00	18.50	20.50
Chicago	19.50	19.50	19.00	20.00
Cleveland	19.50	19.50	19.00	20.00
Detroit	19.50	19.50	19.00	20.00
Duluth	20.00	20.00	.....	20.50
Erie, Pa.	19.50	20.00	19.00	20.50
Everett, Mass.	20.50	21.00	20.00	21.50
Hamilton, O.	19.50	19.50	19.00	.....
Jackson, O.	20.25	20.25	19.75	.....
Neville Island, Pa.	19.50	19.50	19.00	20.00
Provo, Utah	17.50	.....	17.00	.....
Sharpsville, Pa.	19.50	19.50	19.00	20.00
Sparrows Point, Md.	20.50	.....	20.00	.....
Swedeland, Pa.	20.50	21.00	20.00	21.50
Toledo, O.	19.50	19.50	19.00	20.00
Youngstown, O.	19.50	19.50	19.00	20.00
Delivered from Basing Points:				
Akron, O., from Cleveland	20.76	20.76	26.26	21.26
Baltimore from Birmingham	21.08	.....	19.96	.....
Boston from Birmingham	20.62	.....	20.50	.....
Boston from Everett, Mass.	21.00	21.50	20.50	22.00
Boston from Buffalo	21.00	21.50	20.50	22.00
Brooklyn, N. Y., from Bethlehem	22.93	23.43	.....	.....
Brooklyn, N. Y., from Bmghm.	22.50	.....	.....	.....
Canton, O., from Cleveland	20.76	20.76	20.26	21.26
Chicago from Birmingham	†19.72	.....	19.60	.....
Cincinnati from Hamilton, O.	20.58	20.58	20.08	.....
Cincinnati from Birmingham	20.20	.....	19.20	.....
Cleveland from Birmingham	19.62	.....	19.12	.....
Indianapolis from Hamilton, O.	21.93	21.93	21.43	22.43
Mansfield, O., from Toledo, O.	21.26	21.26	20.76	21.76
Milwaukee from Chicago	20.57	20.57	20.07	21.07
Muskegon, Mich., from Chicago Toledo or Detroit	22.60	22.60	22.10	23.10
Newark, N. J., from Birmingham	21.61	.....	.....	.....
Newark, N. J., from Bethlehem	21.99	22.49	.....	.....
Philadelphia from Birmingham	20.93	.....	20.81	.....
Philadelphia from Swedeland, Pa.	21.31	21.81	20.81	.....
Pittsburgh district from Neville Island	Neville base plus 67c, 81c and $1.21 switching charges			
Saginaw, Mich., from Detroit	21.75	21.75	21.25	21.25

Delivered from Basing Points:	No. 2 Fdry	Malleable	Basic	Bessemer
St. Louis, northern	20.00	20.00	19.50	.....
St. Louis from Birmingham	†19.62	.....	19.50	.....
St. Paul from Duluth	21.94	21.94	.....	22.44

†Over 0.70 phos.

Low Phos

Basing Points: Birdsboro and Steelton, Pa., and Standish, N. Y., $24.00, Phila. base, standard and copper bearing, $25.13.

Gray Forge		Charcoal	
Valley furnace	19.00	Lake Superior fur.	$22.00
Pitts. dist. fur.	19.00	Do., del. Chicago	25.25
		Lyles, Tenn.	22.50

Silvery†

Jackson county, O., base: 6-6.50 per cent $22.75; 6.51-7—$23.25; 7-7.50—$23.75; 7.51-8—$24.25; 8-8.50—$24.75; 8.51-9—$25.25; 9-9.50—$25.75. Buffalo $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base: Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon: 2 to 3%, $1 per ton additional. Each unit over 3%, $1 per ton additional.

Refractories

Per 1000 f.o.b. Works

Fire Clay Brick

Super Quality

Pa., Mo., Ky.	$55.00

First Quality

Pa., Ill., Md., Mo.	$45.00
Alabama, Ga., Ky.	$40.00-45.00

Second Quality

Pa., Ill., Ky., Md., Mo.	40.00
Ga., Ala.	35.00

Ohio

First quality	$40.00
Intermediary	37.00
Second quality	28.00

Malleable Bung Brick

All bases	50.00

Silica Brick

Pennsylvania	$45.00
Joliet, E. Chicago	54.00
Birmingham, Ala.	52.00

Magnesite

Imported dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	$45.00
Domestic dead-burned grains, net ton f.o.b. Chester, Pa., and Baltimore bases (bags)	40.00
Domestic dead-burned gr. net ton f.o.b. Chewelah, Wash. (bulk)	22.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick	$45.00
Chemically bonded chrome brick	45.00
Magnesite brick	65.00
Chemically bonded magnesite brick	55.00

Fluorspar, 85-5

Washed gravel, duty paid, tide, net ton	$20.00
*Washed gravel, f.o.b. Ill., Ky., net ton, carloads	$16.00-17.00

Ferroalloys

Dollars, except Ferrochrome

Ferromanganese, 78-82% tidewater, duty paid	85.00
Do., Balti. base	85.00
Do., del. Pittsb'gh	90.13
Spiegeleisen, 19-20% dom. Palmerton, Pa., spot†	26.00
Do., New Orleans	26.00
Ferrosilicon, 50% freight all., cl.	77.50
Do., less carload	85.00
Do., 75 per cent	126-130.00
Spot, $5 a ton higher.	
Silicoman., 2½ carb.	90.00
2% carbon, 95.00; 1%, 105.00	
Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb. del.	10.00
Ferrotungsten, stand., lb. con. del.	1.35- 1.45
Ferrovanadium, 35 to 40% lb., cont.	2.70- 2.90
Ferrotitanium, c. l., prod. plant, frt. allow., net ton	137.50
Spot, 1 ton, frt. allow., lb.	7.00
Do., under 1 ton	7.50
Ferrophosphorus, per ton, c. l., 17-19% Rockdale, Tenn., basis, 18%, $2 unitage	50.00
Ferrophosphorus, electrolytic, per ton c. l., 23-26% f.o.b. Anniston, Ala., 24% $2.75 unitage	65.00
Ferromolybdenum, stand. 55-65%, lb.	0.95
Molybdate, lb. cont.	0.80
†Carloads, Quan. diff. apply.	

Nonferrous

METAL PRICES OF THE WEEK

Spot unless otherwise specified. Cents per pound

	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin New York Spot	Straits Tin New York Futures	Lead New York N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Chinese Spot, N. Y.	Nickel Cathodes
Nov. 23	9.25	9.37½	8.85	50.87½	48.50	4.50	4.35	4.85	*19.00	14.00	35.00
Nov. 25	9.25	9.37½	8.85	50.87½	48.25	4.50	4.35	4.85	*19.00	14.00	35.00
Nov. 26	9.25	9.37½	8.85	51.25	48.37½	4.50	4.35	4.85	*19.00	14.00	35.00
Nov. 27	9.25	9.37½	8.85	51.25	48.50	4.50	4.35	4.85	*19.00	14.00	35.00
Nov. 28—Holiday											
Nov. 29	9.25	9.37½	8.85	51.25	48.37½	4.50	4.35	4.85	*19.00	14.00	35.00

*Nominal range 19.00 to 21.00c.

MILL PRODUCTS

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 9.00c Conn. copper.

Sheets	
Yellow brass (high)	14.62½
Copper hot rolled	16.25
Lead cut to jobbers	8.25
Zinc, 100-lb. base	9.50
Tubes	
High yellow brass	16.62½
Seamless copper	16.75
Rods	
High yelow brass	13.12½
Copper, hot rolled	13.50
Anodes	
Copper untrimmed	14.00
Wire	
Yellow brass (high)	15.12½

OLD METALS

Deal. buying prices, cents lb.

No. 1 Composition Red Brass	
New York	5.50- 5.75
*Cleveland	6.00- 6.25
Chicago	5.87½- 6.00
St. Louis	6.00- 6.25
Heavy Copper and Wire	
New Yorw, No. 1	7.00- 7.25
Chicago, No. 1	6.87½-7.12½
Cleveland	6.75- 7.00
*St. Louis, No. 1	7.00- 7.37½
Composition Brass Borings	
New York	5.00- 5.25
Light Copper	
New York	5.75- 6.00
Chicago	5.37½-5.62½
Cleveland	5.75- 6.00
St. Louis	5.75- 6.00
Light Brass	
Chicago	3.25- 3.50
*Cleveland	3.25- 3.50
St. Louis	3.50- 3.75
Lead	
New York	3.50- 3.75
*Cleveland	3.50- 3.75
Chicago	3.37½-3.62½
St. Louis	3.65- 3.75
Zinc	
New York	2.00- 2.25
Cleveland	2.50- 2.75
St. Louis	2.75- 3.00
Aluminum	
Borings, Cleveland	8.50- 9.00
Mixed, cast, Cleve.	13.25-13.50
Mixed, cast, St. L.	13.00-13.50
Clips, soft, Cleve.	14.75-15.00

SECONDARY METALS

Brass ingot, 85-5-5-5	9.25
Stand. No. 12 alum.	17.00-17.50

Iron and Steel Scrap Prices

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated

HEAVY MELTING STEEL

Birmingham	8.50- 9.50
Boston, dock, expt.	9.50- 9.75
Boston, domestic	7.50- 7.75
Buffalo, No. 1	11.50-12.00
Buffalo, No. 2	10.00-10.50
Chicago, No. 1	13.50-14.00
Cleveland, No. 1	12.50-13.00
Cleveland, No. 2	11.50-12.00
Detroit, No. 1	9.25- 9.75
Detroit, No. 2	7.50- 8.00
Eastern Pa., No. 1	12.00-12.50
Eastern Pa., No. 2	11.00
Federal, Ill.	9.50-10.00
Granite City, R. R.	10.25-10.75
Granite City, No. 2	8.75- 9.25
N. Y., deal, No. 2	7.50- 7.75
N. Y., deal. barge	8.50- 8.75
Pitts., No. 1 (R. R.)	14.50-15.00
Pitts., No. 1 (dlr.)	13.50-14.00
Pittsburgh, No. 2	12.00-12.50
St. Louis	8.75- 9.25
Valleys, No. 1	13.50-14.00

COMPRESSED SHEETS

Buffalo, dealers	10.00-10.50
Chicago, factory	12.50-13.00
Chicago, dealer	11.50-12.00
Cleveland	11.75-12.25
Detroit	9.50-10.00
E. Pa., new mat.	11.50-12.00
Pittsburgh	13.25-13.75
St. Louis	6.25- 6.75
Valleys	12.75-13.00

BUNDLED SHEETS

Buffalo	8.00- 8.50
Cincinnati, del.	7.50- 8.00
Cleveland	9.50-10.00
Pittsburgh	12.50-13.00
St. Louis	4.50- 5.00

SHEET CLIPPINGS, LOOSE

Chicago	8.00- 8.50
Cincinnati	7.00- 7.50
Detroit	5.00- 5.50
St. Louis	4.75- 5.25

STEEL RAILS, SHORT

Birmingham	12.00-12.50
Buffalo	14.50-15.00
Chicago (3 ft.)	15.00-15.50
Chicago (2 ft.)	16.00-16.50
Cincinnati, del.	13.50-14.00
Detroit	12.50-13.00
Pitts., open-hearth, 3 ft. and less	15.00-15.50
St. Louis, 2 ft. & less	13.25-13.75

STEEL RAILS, SCRAP

Boston	7.50- 7.75
Chicago	13.50-14.00
Pittsburgh	14.00-14.50
St. Louis	11.50-12.00
Buffalo	11.50-12.00

STOVE PLATE

Birmingham	7.00- 7.50
Boston, dealers	3.50- 3.75
Buffalo	10.25-10.75
Chicago	7.00- 7.50
Cincinnati, dealers	7.00- 7.50
Detroit, net	7.00- 7.50
Eastern Pa.	9.50
N. Y., deal. fdry.	6.00
St. Louis	8.00- 8.50

COUPLERS, SPRINGS

Buffalo	14.50-15.00
Chicago, springs	14.00-14.50
Eastern Pa.	14.50-15.00
Pittsburgh	15.75-16.25
St. Louis	12.00-12.50

ANGLE BARS—STEEL

Chicago	14.00-14.50
St. Louis	12.00-12.50

RAILROAD SPECIALTIES

Chicago	14.00-14.50

LOW PHOSPHORUS

Buffalo, billet and bloom crops	14.50-15.00
Cleveland, billet, bloom crops	16.00-16.50
Eastern Pa., crops	15.50-16.00
Pittsburgh, billet, bloom crops	16.00-16.50
Pittsburgh, sheet bar crops	14.75-15.25

FROGS, SWITCHES

Chicago	13.50-14.00
St. Louis, cut	11.50-12.00

SHOVELING STEEL

Chicago	13.50-14.00
Federal, Ill.	9.50-10.00
Granite City, Ill.	8.75- 9.25

RAILROAD WROUGHT

Birmingham	7.00- 7.50
Boston, dealers	6.00- 6.50
Buffalo, No. 1	10.00-10.50
Buffalo, No. 2	11.50-12.00
Chicago, No. 1, net	10.00-10.50
Chicago, No. 2	13.50-14.00
Cincinnati, No. 2	9.50-10.00
Eastern Pa.	12.00-12.50
N. Y., No. 1, deal.	9.50-10.00
St. Louis, No. 1	6.75- 7.20
St. Louis, No. 2	10.25-10.75

SPECIFICATION PIPE

Eastern Pa.	10.50
New York, dealers	3.50- 4.00

BUSHELING

Buffalo, No. 1	10.00-10.50
Chicago, No. 1	11.50-12.00
Cinci., No. 1, deal.	7.50- 8.00
Cincinnati, No. 2	4.00- 4.50
Cleveland, No. 2	7.25- 7.75
Detroit, No. 1, new	8.50- 9.00
Valleys, new, No. 1	12.50-12.75

MACHINE TURNINGS

Birmingham	4.00- 4.50
Boston, dealers	3.25- 3.50
Buffalo	5.75- 6.25
Chicago	6.50- 7.00
Cincinnati, dealers	5.50- 6.00
Cleveland	7.00- 7.50
Detroit	4.75- 5.25
Eastern Pa.	7.50- 8.00
New York, dealers	3.50- 3.75
Pittsburgh	9.50-10.00
St. Louis	2.25- 2.75
Valleys	9.00- 9.50

BORINGS AND TURNINGS

For Blast Furnace Use

Boston, dealers	2.50- 2.75
Buffalo	7.75- 8.25
Cincinnati, dealers	5.00- 5.50
Cleveland	7.25- 7.75
Detroit	5.25- 5.75
Eastern Pa.	6.00- 6.50
New York, dealers	2.00- 2.50
Pittsburgh	8.00- 9.00

CAST IRON BORINGS

Birmingham, plain	4.00- 4.50
Boston, chemical	5.50- 6.50
Boston, dealers	3.25- 3.50
Buffalo	7.75- 8.25
Chicago	6.00- 6.50
Cincinnati, dealers	5.00- 5.50
Cleveland	7.25- 7.75
Detroit	5.25- 5.75
E. Pa., chemical	10.00-12.00
New York, dealers	2.00- 2.50
St. Louis	3.25- 3.75

PIPE AND FLUES

Cincinnati, dealers	6.50- 7.00

RAILROAD GRATE BARS

Buffalo	8.50- 9.00
Chicago, net	7.50- 8.00
Cincinnati	5.50- 6.00
Eastern Pa.	9.00- 9.50
New York, dealers	5.00- 5.25
St. Louis	4.50- 5.00

FORGE FLASHINGS

Boston, dealers	5.75- 6.00
Buffalo	10.50-11.00
Cleveland	10.50-11.00
Detroit	8.00- 8.50
Pittsburgh	12.25-12.75

FORGE SCRAP

Boston, dealers	4.50- 5.00
Chicago, heavy	14.00-14.50
Eastern Pa.	11.50-12.00

ARCH BARS, TRANSOMS

St. Louis	12.00-12.50

AXLE TURNINGS

Boston, dealers	3.75- 4.25
Buffalo	10.50-11.00
Chicago, elec. fur.	12.00-12.50
Eastern Pa.	11.00
St. Louis	7.75- 8.25

STEEL CAR AXLES

Birmingham	12.00-12.50
Boston, ship. point.	10.50-11.00
Buffalo	14.50-15.00
Chicago, net	14.50-15.00
Eastern Pa.	17.00
St. Louis	12.50-13.00

SHAFTING

Boston, ship point.	13.00-13.25
Eastern Pa.	18.50
New York, dealers	13.50-14.00
St. Louis	11.00-11.50

CAR WHEELS

Birmingham	9.00- 9.50
Boston, iron deal.	6.00- 6.25
Buffalo, iron	11.00-11.50
Buffalo, steel	14.50-15.00
Chicago, iron	13.00-13.50
Chicago, rolled steel	14.00-14.50
Cincinnati, iron	10.00-10.50
Eastern Pa., iron	12.50-13.00
Eastern Pa., steel	14.50-15.00
Pittsburgh, iron	13.50-14.00
Pittsburgh, steel	15.50-16.00
St. Louis, iron	10.00-10.50
St. Louis, steel	12.00-12.50

NO. 1 CAST SCRAP

Birmingham	9.00- 9.50
Boston, No. 1 mach.	9.00- 9.25
Boston, No. 2	8.25- 8.50
Boston, tex. con.	8.50- 9.00
Buffalo, cupola	12.25-12.75
Buffalo, mach.	13.00-13.50
Chicago, agri. net	10.00-10.50
Chicago, auto	11.00-11.50
Chicago, mach. net	12.00-12.50
Chicago, railr'd net	10.50-11.00
Cinci., mach. cup	10.00-10.50
Cleveland, cupola	12.75-13.25
Detroit, net	10.00-10.50
Eastern Pa., cupola	12.50-13.00
E. Pa., mixed yard	10.50
Pittsburgh, cupola	13.50-14.00
San Francisco, del.	13.50-14.00
Seattle	7.50- 9.00
St. Louis, No. 1	9.50-10.00
St. L., No. 1 mach.	10.75-11.25

HEAVY CAST

Boston, del.	6.25- 6.50
Buffalo, break.	10.50-11.00
Cleveland, break	10.50-11.00
Detroit, No. 1, mach. net	12.00-12.50
Detroit, break.	8.50- 9.00
Detroit, auto net	11.50-12.00
Eastern Pa.	11.50-12.00
N. Y., break. deal.	7.25- 7.75
Pittsburgh	12.50-13.00

MALLEABLE

Birmingham, R. R.	11.50-12.50
Boston, consum.	13.50-14.50
Buffalo	14.50-15.00
Chicago, R. R.	15.50-16.00
Cincinnati, agri. del.	11.00-11.50
Cleveland, rail	15.50-16.00
Detroit, auto net	12.50-13.00
Pittsburgh, rail	16.25-16.75
St. Louis, R. R.	13.50-14.00
Eastern Pa., R. R.	14.00-14.50

RAILS FOR ROLLING

5 feet and over

Birmingham	10.50-11.00
Boston, dealers	8.00- 8.50
Buffalo	12.00-12.50
Chicago	14.50-15.00
Eastern Pa.	13.00-14.00
New York, dealer	10.50-11.00
St. Louis	12.25-12.75

LOCOMOTIVE TIRES

Chicago (cut)	14.00-14.50
St. Louis, No. 1	11.75-12.25

LOW PHOS. PUNCHINGS

Buffalo	14.50-15.00
Chicago	14.50-15.00
Eastern Pa.	15.00-16.00
Pittsburgh (heavy)	15.00-15.50
Pittsburgh (light)	14.50-15.00

Iron Ore

Lake Superior Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.80
Mesabi nonbess.	4.50
High phosphorus	4.40
Mesabi bessemer	4.65
Old range nonbess.	4.65

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63% con. (nom.)	8.00- 9.00
Cop.-free low phos. 58-60% (nom.)	10.00-10.50

Foreign Ore

Cents per unit, f.a.s. Atlantic ports (nominal)

Foreign manganiferous ore, 45.55% iron, 6-10% man.	10.50
No. Afr. low phos.	10.50
Swedish basic, 65%	9.50
Swedish low phos.	10.50
Spanish No. Africa basic, 50 to 60%	10.50
Tungsten, spot sh. ton unit, duty pd.	$15.50-16.00
N. F. fdy., 55%	7.00
Chrome ore, 48% gross ton, c.i.f.	19.25

Manganese Ore

(Nominal)

Prices not including duty, cents per unit cargo lots

Caucasian, 52-55%	26.00
So. African, 52%	26.00
So. Afr., 49-51%	24.00
Indian, 58-60%	nominal
Indian, 48-50%	nominal

Warehouse Iron and Steel Prices

Cents per pound for delivery within metropolitan districts of cities specified

STEEL BARS

Baltimore*	3.00c
Boston††	3.00c
Buffalo	3.00c
Chattanooga	3.36c
Chicago (j)	3.00c
Cincinnati	3.22c
Cleveland	3.00c
Detroit	3.09c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.06c
New Orleans	3.35c
New York‡(d)	3.31c
Pitts. (h)	2.95c-3.10c
Philadelphia*	3.03c
Portland	3.70c
San Francisco	3.50c
Seattle	3.70c
St. Louis	3.25c
St. Paul	3.25c-3.40c
Tulsa	3.25c

IRON BARS

Portland	3.40c
Chattanooga	3.36c
Baltimore*	3.05c
Chicago	2.75c
Cincinnati	3.22c
New York‡(d)	3.36c
Philadelphia*	2.93c
St. Louis	3.20c
Tulsa	3.25c

REINFORCING BARS

Buffalo	2.60c
Chattanooga	3.36c
Chicago	2.10c-2.60c
Cleveland (c)	2.10c
Cincinnati	3.25c
Houston	3.25c
Los Ang., cl.	2.45c
New Orleans	3.50c
Pitts., plain (h)	3.05c
Pitts., twisted squares (h)	3.175c
San Francisco	2.45c
Seattle	2.45c
St. Louis	3.25c
Tulsa	3.25c
Young.	2.30c-2.60c

SHAPES

Baltimore*	3.00c
Boston††	3.19c
Buffalo	3.25c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland	3.31c
Detroit	3.42c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York (d)	3.46c
Philadelphia*	2.98c
Pittsburgh(h)	3.15c
Portland (i)	3.70c
San Francisco	3.50c
Seattle (i)	3.70c
St. Louis	3.45c
St. Paul	3.45c
Tulsa	3.50c

PLATES

Baltimore*	3.00c
Boston††	3.21c
Buffalo	3.37c
Chattanooga	3.56c
Chicago	3.20c
Cincinnati	3.42c
Cleveland, ¼-in. and over	3.31c
Detroit	3.42c
Detroit, ⅜-in.	3.65c
Houston	3.00c
Los Angeles	3.60c
Milwaukee	3.31c
New Orleans	3.55c
New York (d)	3.40c
Philadelphia*	2.98c
Phila. floor	4.95c
Pittsburgh(h)	3.15c
Portland	3.55c
San Francisco	3.50c
Seattle	3.55c
St. Louis	3.45c
St. Paul	3.45c
Tulsa	3.50c

NO. 10 BLUE

Baltimore*	3.10c
Boston††	3.30c
Buffalo	3.62c
Chattanooga	3.36c
Chicago	3.05c
Cincinnati	3.22c
Cleveland	3.11c
Det., 8-10 ga.	3.14c
Houston	3.35c
Los Angeles	3.70c
Milwaukee	3.16c
New Orleans	3.55c
New York	3.31c
Portland	3.75c
Philadelphia*	3.08c
Pittsburgh(h)	2.95c
San Francisco	3.60c
Seattle	3.75c
St. Louis	3.45c
St. Paul	3.30c
Tulsa	3.70c

NO. 24 BLACK

Baltimore*†	3.60c
Boston (g)	2.95c
Buffalo	3.25c
Chattanooga	4.16c
Chicago	3.85c
Cincinnati	4.02c
Cleveland	3.91c
Detroit	3.94c
Los Angeles	4.35c
Milwaukee	3.96c
New Orleans	4.50c
New York	3.89c
Philadelphia*†	3.60c
Pitts.** (h)	3.55c
Portland	4.40c
San Francisco	4.25c
Seattle	4.40c
St. Louis	4.10c
St. Paul	3.90c
Tulsa	4.75c

NO. 24 GALV. SHEETS

Baltimore*†	4.30c
Buffalo	4.00c
Boston (g)	4.65c
Chattanooga	4.86c
Chicago (h)	4.55c
Cincinnati	4.72c
Cleveland	4.61c
Detroit	4.72c
Houston	4.40c
Los Angeles	4.95c
Milwaukee	4.66c
New Orleans	4.95c
New York	4.50c
Philadelphia*†	4.40c
Pitts.** (h)	4.15-4.45c
Portland	5.00c
San Francisco	5.00c
Seattle	5.00c
St. Louis	4.65c
St. Paul	4.50c
Tulsa	5.10c

BANDS

Baltimore*	3.20c
Boston††	3.30c
Buffalo	3.42c
Chattanooga	3.61c
Chicago	3.30c
Cincinnati	3.47c
Cleveland	3.36c
Detroit, ⅜-in. and lighter	3.39c
Houston	3.25c
Los Angeles	4.10c
Milwaukee	3.41c
New Orleans	3.95c
New York (d)	3.56c
Philadelphia	3.18c
Pittsburgh (h)	3.20c
Portland	4.25c
San Francisco	4.10c
Seattle	4.25c
St. Louis	3.55c
St. Paul	3.55c
Tulsa	3.45c

HOOPS

Baltimore	2.30c
Boston	4.30c
Buffalo	3.42c
Chicago	3.30c
Cincinnati	3.47c
Det., No. 14 and lighter	3.39c
Los Angeles	5.85c
Milwaukee	3.41c
New York	3.56c
Philadelphia	3.43c
Pittsburgh (h)	3.70c
Portland	5.60c
San Francisco	6.15c
Seattle	5.60c
St. Louis	3.55c
St. Paul	3.55c

COLD FIN. STEEL

Baltimore (c)	3.58c
Boston	3.75c
Buffalo (h)	3.40c
Chattanooga*	3.98c
Chicago (h)	3.35c
Cincinnati	3.57c
Cleveland (h)	3.35c
Detroit	3.49c
Los Ang. (f) (d)	5.85c
Milwaukee	3.46c
New Orleans	4.15c
New York	3.81c
Philadelphia	3.61c
Pittsburgh	3.20c
Portland (f) (d)	6.00c
San Fran.(f) (d)	5.80c
Seattle (f) (d)	6.00c
St. Louis	3.60c
St. Paul	3.87c
Tulsa	4.50c

COLD ROLLED STRIP

Boston, 0.100-in., 500 lb. lots	3.245c
Buffalo	3.39c
Chicago	3.27c
Cincinnati (b)	3.22c
Cleveland (b)	3.20c
Detroit	3.33c
New York	3.36c
St. Louis	3.45c

TOOLS STEELS

(Applying on or east of Mississippi river; west of Mississippi 1c up)

	Base
High speed	57c
High carbon, high chrome	37c
Oil hardening	22c
Special tool	20c
Extra tool	17c
Regular tool	14c

Uniform extras apply.

BOLTS AND NUTS

(100 pounds or over)

	Discount
Chicago (a)	70
Cleveland	70
Detroit	70-10
Milwaukee	70
Pittsburgh	70

(a) Under 100 pounds, 65 off.

(b) Plus straightening, cutting and quantity differentials; (c) Plus mill, size and quantity extras; (d) Minus quant. diff.; (e) New mill classif. (f) Rounds only; (g) 50 bundles or over; (h) Outside delivery, 10c less; (i) Under 3 inches; (j) shapes other than rounds, flats, fillet angles, 3.15c.

‡Domestic bars; *Plus quan. extras; **Under 25 bundles; *†50 or more bundles; †New extras apply; ††Base 40,000 lbs., extras on less.

Prices on heavier lines are subject to new quantity differentials; 399 lbs. and less, up 50 cts.; 400 to 9999 lbs., base; 10,000 to 19,999 lbs., 15 cts. under; 20,000 to 39,999 lbs., 25 cts. under; 40,000 lbs. and over, 35 cts. under base.

Current Iron and Steel Prices of Europe

Dollars at Rates of Exchange, Nov. 27

Export Prices f. o. b. Ship at Port of Dispatch—(By Cable or Radio)

	British gross tons U. K. ports £ s d	Continental Channel or North Sea ports, metric tons Quoted in dollars at current value	**Quoted in gold pounds sterling £ s d
PIG IRON			
Foundry, 2.50-3.00 Silicon	$15.44 3 2 6	$14.17	1 15 0
Basic bessemer	15.44 3 2 6*	12.95	1 12 0
Hematite, Phos. .03-.05	16.06 3 5 0	.....	.....
SEMIFINISHED STEEL			
Billets	$27.17 5 10 0	$19.02	2 7 0
Wire rods, No .5 gage	41.99 8 10 0	36.44	4 10 0
FINISHED STEEL			
Standard rails	$40.76 8 5 0	$44.53	5 10 0
Merchant bars	1.66c 7 10 0	1.15c to 1.20c	3 2 6 to 3 5 0
Structural shapes	1.66c 7 10 0	1.14c	3 1 6
Plates, †¼ in. or 5 mm.	1.77c 8 0 0	1.56c	4 5 0
Sheets, black, 24 gage or 0.5 mm	2.10c 9 10 0	2.13c	5 16 0††
Sheets, gal., 24 gage, corr.	2.54c 11 10 0	2.19c	6 0 0
Bands and strips	1.88c 8 10 0	1.46c	4 0 0
Plain wire, base	2.04c 9 5 0	1.96c	5 7 6
Galvanized wire, base	2.38c 10 15 0	2.29c to 2.33c	6 5 6 to 6 7 6
Wire nails, base	2.65c 12 0 0	2.11c	5 15 0
Tin plate, box 108 lbs.	$ 4.63 0 18 9	.....	.....

British ferromanganese $85 delivered Atlantic seaboard, duty-paid. German ferromanganese £9 0s 0d ($43.74) f.o.b.

Domestic Prices at Works or Furnace—Last Reported

	£ s d		French Francs		Belgian Francs		Reich Marks
Fdy. pig iron, Si. 2.5	$17.29	3 10 0(a)	$17.13	260	$12.50	370	$25.36 63
Basic bessemer pig iron	17.29	3 10 0(a)	12.52	190	11.83	350	27.97 (b)69.50
Furnace coke	4.20	0 17 0	6.26	95	3.89	115	7.65 19
Billets	27.17	5 10 0	28.34	430	18.25	540	38.85 96.50
Standard rails	1.82c	8 5 0	2.08c	694	1.65c	1,100	2.42c 132
Merchant bars	1.90c	8 12 0	1.68c	560	.90c	600	2.01c 110
Structural shapes	1.93c	8 15 0	1.65c	550	.90c	600	1.97c 107.50
Plates, †¼-in. or 5 mm.	2.00c	9 1 3	2.10c	700	1.05c	700	2.32c 127
Sheets, black	2.49c	11 5 0§	1.80c	600‡	1.24c	825‡	2.64c 144‡
Sheets, galv., corr., 24 ga. or 0.5 mm	2.93c	13 5 0	3.00c	1,000	2.25c	1,500	6.77c 370
Plain wire	2.04c	9 5 0	3.15c	1,050	1.73c	1,150	3.17c 173
Bands and strips	2.07c	9 7 0	1.95c	650	1.26c	840	2.32c 127

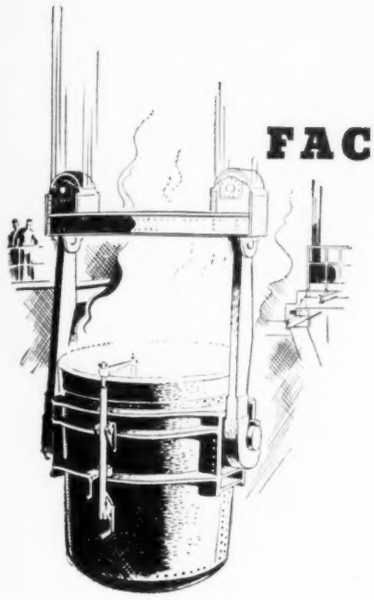
*Basic. †British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-bessemer steel. a del. Middlesbrough. b hematite. ††Close annealed.

**Gold pound sterling carries a premium of 66.25 per cent over paper sterling.

Zirconium Alloys

added to the Ladle

FACILITATE GRAIN SIZE CONTROL



PRODUCTS OF A UNIT OF UCC UNION CARBIDE AND CARBON CORPORATION

CHROMIUM
High-Carbon Ferrochrome (maximum 6% carbon)
Low-Carbon Ferrochrome (in grades, maximum 0.06% to maximum 2.00% carbon)
Chromium Metal
Chromium-Copper
Miscellaneous Chromium Alloys

SILICON
Ferrosilicon 15% Ferrosilicon 50%
Ferrosilicon 75%
Ferrosilicon 80 to 85%
Ferrosilicon 90 to 95%
Refined Silicon
(minimum 97% Silicon)
Calcium Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon
Miscellaneous Silicon Alloys

BRIQUETS
(Patented)
Chrome Briquets Silicon Briquets
Manganese Briquets

COLUMBIUM

TUNGSTEN

MANGANESE
Standard Ferromanganese
78 to 82%
Low-Carbon Ferromanganese
Medium-Carbon Ferromanganese
Spiegeleisen
Manganese Metal
Manganese-Copper
Miscellaneous Manganese Alloys

SILICO-MANGANESE
All grades including Silico-Spiegel

VANADIUM
All Grades

ZIRCONIUM
35 to 40% Zirconium
12 to 15% Zirconium
Aluminum-Zirconium

●Zirconium alloys added to the ladle provide a reliable, convenient, and economical method of facilitating grain size control in steel. Zirconium is a powerful deoxidizer having a definite and regular effect. Hence zirconium alloys provide a low-cost material for the exact control of the degree of deoxidation essential to successful grain size control. Steel treated only with zirconium is intermediate in grain size—ideal for forging and heat-treating. Tests in many steel plants indicate that ladle additions of zirconium alloys for facilitating grain size control consistently meet requirements exceptionally well.

The particles of zirconium compounds formed in the steel are small, well-distributed, and not objectionable. Thus high shock resistance and good machinability are assured. Strong tough steel is obtained.

Electromet can supply you with zirconium alloys and assist you in their advantageous use. Write today for complete information.

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation

UCC

CARBIDE and CARBON BUILDING
30 EAST 42nd ST., NEW YORK, N. Y.

Electromet
Ferro-Alloys & Metals

HOLD THAT ARC!

with

P&H HANSEN'S

UNIFORM CURRENT

Current fluctuations in your arc welding generator cause "sticky" electrodes, heat variations, irregular penetration and uneven strength. These characteristics are not found in P&H-Hansen welders.

The reason is that the uniform current characteristics are "inbuilt" with P&H-Hansen's exclusive internal stabilizer winding. External reactors, resistors and stabilizers aren't needed. There's one simple way to prove to yourself just how welding arcs behave. Look at the oscillograph records. Compare them! See how the irregular, jagged line smooths out when a P&H-Hansen takes hold. Then see what this means in faster, easier and better welding.

Ask us to send you a copy of Bulletin HW-4.

HARNISCHFEGER CORPORATION
4411 W. NATIONAL AVE., MILWAUKEE, WIS.

P&H HANSEN ARC WELDERS

—The Market Week—

Bars

Bar Prices, Page 64

Pittsburgh — Producers have decided on an unchanged price policy for first quarter, at 1.85c, base, Pittsburgh. This price, as since Sept. 1, 1935, applies for base quantities of 5 to 25-ton lots of a size and analysis for shipment at one time. Proposals are being considered to make some change in quantity differentials in hot-rolled alloy steel bars.

Cleveland — Automobile manufacturers and forge shops continue the largest buyers, orders for 600 to 800 tons being placed during the week, and miscellaneous demand exceptionally strong for this time of the year. Users have not laid up stocks, and buying is expected to hold to a fairly good average for several weeks. The postponement of price advances, which came as a surprise even to district sales managers, favors the small consumers, who are not in a financial position now to acquire stocks, but whose situation is steadily improving. Some of the contracts placed in anticipation of a price increase may not be specified. Casting up the year's business, tonnage has been fairly evenly distributed, there being no "poor" months this year, and prospects continuing to improve.

Chicago — What effect the continuation of current bar prices into first quarter will have upon orders the remainder of the year has yet to be disclosed, though a fair portion of recent buying is believed to have been in anticipation of higher quotations. At the same time consumption among leading users has been holding at an active rate and heavy needs of the automotive and farm implement industries are expected to continue. Little change has been noted in operations of miscellaneous consumers. First quarter business will be taken at 1.90c, base, for soft steel bars, 1.75c for rail steel, and 1.80c, Chicago and 1.75c, Terre Haute, Ind., for bar iron.

Boston—There has been little protective covering against expected rise in commercial bar prices. Volume, except in alloy and forging bars, is off slightly. Bids close next week on close to 150 tons of nickel steel bars for chainmaking at the Boston navy yard.

New York — The let-up in commercial bar specifications is expected to be more pronounced than in the other major heavy products, as there has been more anticipatory buying in expectation of an advance which has failed to develop. A week ago there were persistent rumors of

REVOLUTIONARY!

the

P&H HANSEN

50-AMP. WELDER

Furniture, aeroplanes, toys, auto bodies, small tubing, light gauge metal containers — both ferrous and non-ferrous—these are a few of the new applications the P&H-Hansen 50-Amp. welder is finding.

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P&H HANSEN ARC WELDERS

a $3 increase, and while many consumers held back awaiting final indication, others were sufficiently convinced there would be an advance that they released some fair tonnages. The reaffirmation of existing prices has changed the outlook for next month considerably. The market is 1.85c, Pittsburgh, or 2.20c, New York.

Ludlum Steel Co., Watervliet, N. Y., announces its books will be open Dec. 2, for first quarter, on high speed carbon and alloy tool steels with no change in base prices or extras.

Plates

Plate Prices, Page 64

Pittsburgh — An unstated buyer has come into the market with a request for 20 standard coal barges. Dravo Contracting Co., Neville Island, Pa., is requiring 500 tons of plates for replacing two Pittsburgh Coal Co. wooden hulls with arc-welded all-steel hulls, each with 13 water-tight compartments.

Cleveland — Plate specifications generally are limited to carload lots, and these are less frequent than in October. Cleveland will open bids Dec. 4 on a 30-inch water main requiring 750 tons of plates.

Chicago—Lettings on water system construction by municipalities have been numerous recently as a result of the government's attempt to speed work relief projects, and bids were taken on about 50 water tanks the past month. This is about double the number of similar jobs during the several preceding months, but contracts have yet to be placed and it is doubtful whether all will materialize. Industrial tank work is only moderately active, while pipe line business continues quiet. Railroads are accounting for slightly larger tonnages of plates for repairs and car building, with better demand in prospect as a result of improved inquiries for new equipment.

Boston—Individual plate orders are larger, led by shipyard and standpipe requirements. Several contracts for 200,000-gallons capacity each have been placed. Small miscellaneous business has dropped off, due in part to small tank heads.

New York—With sellers now reaffirming present prices for next quarter, prospects of an active December have been considerably dimmed. Undoubtedly, substantial tonnages that would have come in for delivery by the end of this year had there been an advance will be held over. Spot demands of late have been better, although it is doubtful if the month as a whole will be up to last month for most district sellers. Bids go in Dec. 2 on three ferries for New York city, requiring a total of 3600 tons of plates, shapes and bars.

Miscellaneous demand is featured by a number of small water tank projects, practically all government financed. As work on construction is expected to be under way by Dec. 15, on all PWA projects, these jobs are especially numerous. Incidentally, there are various interpretations of the term "under construction" and it appears to be the general belief that as the time approaches interpretations by PWA will be reasonably broad; in fact, some trade interests look for the deadline to be extended.

International Mercantile Marine-Roosevelt Steamship Co. is asking new bids Dec. 5 on a liner requiring 15,000 tons of hull steel.

Seattle — Tacoma, Wash., has called bids Dec. 6 for the third unit of the Green river gravity water improvement, replacing wood pipe with 2021 feet of 52-inch and 4042 feet with 58-inch. Specifications call

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for alternate steel and reinforcing but the job may go to concrete pipe, it is said. If steel pipe is adopted, plate tonnage will exceed 1500 tons.

Contracts Placed

500 tons, replacement of wooden hulls on two Ohio river steamboats with arc-welded all-steel hulls, for Pittsburgh Coal Co., Pittsburgh, to Dravo Contracting Co., Neville Island, Pa.

140 tons, one 100 x 30-foot steel barge, for Theodore Brent, New Orleans, to L. F. Alexander Co., New Orleans.

100 tons, PWA tanks at Emporia, Va., and Strassburg, Va., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

Unstated tonnage, 900,000-gallon elevated water tank, North Platte, Nebr., to Chicago Bridge & Iron Works, Chicago.

Contracts Pending

2000 tons, 52 and 58-inch welded steel or reinforcing concrete pipe, third unit, Green River pipe line, Tacoma, Wash.; bids Dec. 6.

1860 tons, pumping units, specification 133, metropolitan water district, Los Angeles; Winston Bros., Los Angeles, low on general contract at $1,731,781.

1650 tons, 36-inch welded steel pipe, treasury department, invitation 126, Berkeley, Calif.; bids opened.

750 tons, 30-inch water main, Cleveland; bids Dec. 4.

44% said

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Transportation

Track Material Prices, Page 65

Distribution of 70,000 tons of 131-pound steel rails by the Union Pacific, with 30,000 tons of fastenings, represents the largest rail tonnage since the Pennsylvania placed 100,000 tons of rails in December, 1933. The rails were divided among Carnegie-Illinois Steel Corp., Pittsburgh, Inland Steel Co., Chicago, and Colorado Fuel & Iron Co., Denver. Chicago Great Western has divided 7100 tons of rails between Carnegie-Illinois and Inland and a similar tonnage of fastenings among various suppliers.

Southern Pacific plans to spend more than $1,000,000 in 1936 for air conditioning its equipment. Chicago, Burlington & Quincy is receiving steel for building the first 500 of the 1250 freight cars it has placed with its own shops. The Pennsylvania has not announced results of bids on 10,000 freight cars, taken two weeks ago.

Railroad spikes have been advanced $4 per ton to 2.60c, base, and track bolts $1 per ton to 3.60c, base. Other fastenings are unchanged. Standard rails will not be advanced from $36.37½ per ton, in spite of rumors of a change.

The Pennsylvania is understood to have made distribution of its car program late last week, with outside car shops obtaining a fair proportion.

Rail Orders Placed

Chicago Great Western, 7100 tons, to Carnegie-Illinois Steel Corp., Pittsburgh, and Inland Steel Co., Chicago. Accessories totaling 6900 tons divided among various producers.

Union Pacific, 70,000 tons, 131-pound rails, to Carnegie-Illinois Steel Corp., Pittsburgh; Colorado Fuel & Iron Co., Denver; Inland Steel Co., Chicago. Accessories totaling 30,000 tons, divided among various producers.

Buses Booked

American Car & Foundry Motors Co., New York: Nine 30-passenger city coaches for Memphis Street Railway, Memphis, Tenn.; three 30-passenger city coaches for Syracuse Co-ordinated Bus Lines, Syracuse, N. Y.; two 40-passenger city coaches for Worcester Street Railway, Worcester, Mass.; two 35-passenger city coaches for Fitchburg & Leominster Street Railway, Fitchburg, Mass.

Twin Coach Corp., Kent, O.: Fifteen 37-passenger and fifteen 40-passenger city coaches for North Shore Bus Lines Inc., Flushing, L. I.; eighteen 23-passenger coaches for Milwaukee

Electric Railway & Light Co., Milwaukee; five 22-passenger coaches for Kahului Railroad Co., Kahului, Maui, T. H.; four 22-passenger coaches for Red Star Way Inc., St. Clairsville, O.; four 31-passenger coaches for Washington Rapid Transit Co., Washington; four 23-passenger coaches for Spokane United Railways, Spokane; two 23-passenger and two 30-passenger coaches for Louisville Railway Co., Louisville, Ky.; two 31-passenger coaches for North Bank Highway Stages, Portland, Oreg; one 23-passenger coach for Winfield Bus Co., Winfield, Kans.; one 31-passenger coach for San Diego Electric Railway, San Diego, Calif.; one 37-passenger coach for Schuylkill Valley Lines, Norristown, Pa.; one 23-passenger coach for city of Coral Gables, Fla.

Sheets

Sheet Prices, Page 64

Pittsburgh — Steel sheet users have been informed that producers' books are now open for the first quarter at unchanged Pittsburgh base prices, continuing 2.40c on black sheets, 3.10c on galvanized, and 1.85c on No. 10 gage hot rolled, 24 to 48 inches wide. Full-finished sheet prices also have been extended, 2.50c applying on No. 10 gage cold rolled, 2.95c on No. 20 gage; 2.50c for No. 10 gage enameling stock, and 3.10c on No. 20 gage.

Cleveland — Pressure for delivery of full finished sheets has been relieved since the announcement that books will be opened for first quarter without change in price. Recently mills had difficulty in fitting new orders for these grades to rolling schedules to insure delivery before Jan. 1. The material is actually wanted, but shipments on some tonnages previously marked for this year will extend into January. Demand from automobile, refrigerator, stove and washing machine manufacturers is strong.

Chicago—Sheet prices are being extended unchanged into first quarter, with books now open for that period. An advance in prices had been anticipated and a portion of business entered on books recently was intended to cover some of next quarter's requirements. As yet mills report no attempts by consumers to cancel speculative tonnages and the fact that consumption is in steady and heavy volume indicates that material now being shipped is moving quickly into consumption. The sold-up condition of mills recently had been an important factor also in forward buying. Mill operations continue at capacity in most instances.

New York—Perhaps in no product was the decision to reaffirm existing prices for first quarter more surprising than in sheets. The trade generally looked for upward revisions. The outlook for tonnage still is promising, and it is the reasonable exception in many quarters that price stability will in the long run stimulate volume. Bids will be opened Dec. 4 by the state of New York on 1600 tons of No. 24 gage pickled, blue finished sheets for license tags. This opening was originally scheduled for Nov. 18, but in view of the fact that none of the prospective bidders were willing to quote for delivery beyond the end of this year, the date was postponed.

Boston—Demand for sheets for small tank fabrication has declined, but industrial buying for miscellaneous needs is well sustained.

Philadelphia—Sheet sellers are opening books Dec. 2 at unchanged prices. They expect substantial contracting, with consumers anxious to get good positions on new schedules.

Buffalo—Bethlehem Steel Co.'s sheet mills here are operating at 90 per cent, and booked solidly at this rate through the end of the year. It is expected to get first hot metal from the new Bethlehem strip mill here some time this month although

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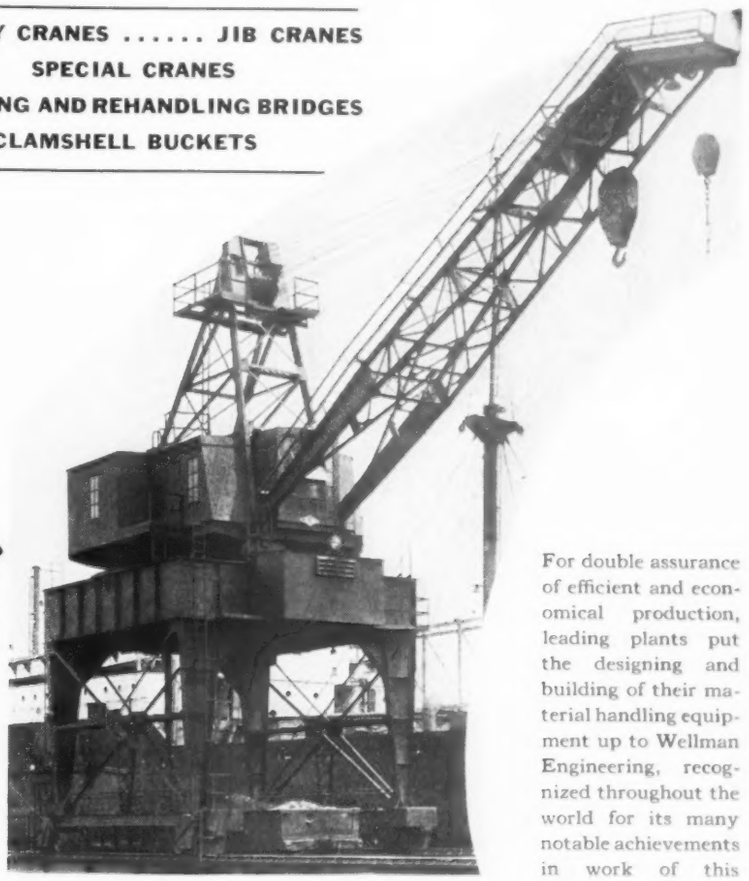

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full operations probably may not be expected for about 60 days.

Cincinnati—District sheet mills have opened books for first quarter business at unchanged prices. Bookings recently have been heavy, partly due to anticipation of an advance. Production schedules near capacity are assured for December.

St. Louis—Purchasing of steel sheets is well maintained. Shipments are heavy, and there has been a considerable volume of buying for first quarter. Purchasing by the automotive industry, particularly parts manufacturers, is brisk.

Pipe

Pipe Prices, Page 65

Pittsburgh — No change has been announced as yet in discounts on steel or iron pipe, although late last week producers indicated they would open books for the first quarter on Dec. 2. Diversity in small orders features the market, with a number of PWA jobs actively taking material. No pipelines of consequence have developed into contracts although a promising prospective inquiry still is the 300-mile line for the Panhandle Eastern Pipe Line Co. from a point in Indiana to Detroit, which will be either 22 or 24-inch pipe.

Cleveland — Many small projects financed with federal funds are maturing, and the aggregate tonnage of cast pipe placed for them is fairly heavy, generally ranging from 25 to 50 tons. The principal outlet for steel pipe is through jobbers, who are ordering regularly but in relatively small lots.

Chicago—Government pressure on municipalities to speed work financed by federal funds has resulted in a flood of requests for bids on pipe to be used in water and sewage systems. A large volume of potential pipe business is being accumulated which is expected to be released shortly. Cast pipe producers defer announcements regarding an anticipated increase in prices.

Boston—With several thousand tons purchased or on inquiry, pipe demand is much stronger, notably for cast grades. Inquiry for merchant steel pipe is steady, with some gain being made by wrought iron as well.

Birmingham, Ala.—Production is a shade better than it has been for the past few weeks, as numerous PWA contracts are being placed. Pipe prices will be increased shortly, following advance in base quotations on iron and other material.

San Francisco—While awards of cast pipe are confined to small lots, more than 13,500 tons is either up for figures or pending. Standard Oil Co. of California, San Francisco, recently placed, with an unnamed interest, 1000 tons of line pipe for work in the Kettleman Hills and Hanford districts.

Seattle — Aggregate tonnage up for figures is the heaviest in more than a year. Specifications are mainly from municipal sources. The largest project pending is for Salem, Oreg., where bids will be asked soon for improvements estimated to total eventually $1,000,000.

Cast Pipe Placed

700 tons, 12-inch, Sudbury, Mass., to United States Pipe & Foundry Co., Burlington, N. J.

110 tons, water line, Barnesville, O., to James B. Clow & Sons, Chicago.

103 tons, 10-inch, Lexington, Va., to Glamorgan Pipe & Foundry Co., Lynchburg, Va.

Cast Pipe Pending

2298 tons, 8-inch, class 150, PWA project, Los Angeles; bids Dec. 3.

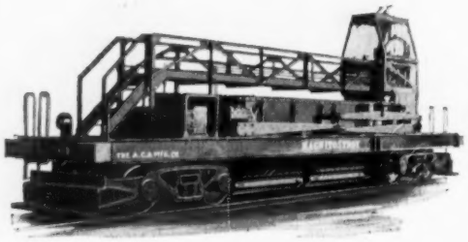
1850 tons, 24-inch and under, Boston; bids Dec. 3.

1283 tons, 16-inch, San Francisco; United States Pipe & Foundry Co., Burlington, N. J., low.

1200 tons, mostly small sizes, North Reading, Mass.; bids Dec. 5.

850 tons, 8 to 16-inch, Oakland, Calif.;

ATLAS SCALE CARS



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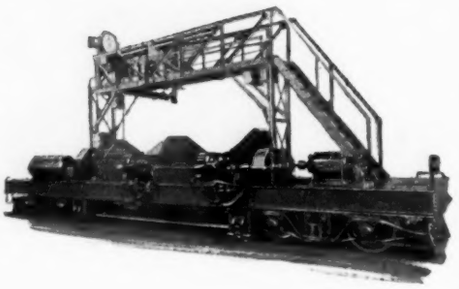

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CLEVELAND, OHIO

bids in.
300 tons, West Stockbridge, Mass.
250 tons, 4 and 6-inch, Galt, Calif.; bids Dec. 7.
200 tons, small sizes, Belmont, N. H.
159 tons, 4 to 8-inch, class 250, San Bernardino, Calif.; bids in.
154 tons, 16-inch, San Diego, Calif.; United States Pipe & Foundry Co., Burlington, N. J., low.
125 tons, 12 and 16-inch, Sacramento, Calif.; bids in.
100 tons, Clifton, Idaho; bids in.
Unstated tonnage, water system improvements, Salem, Oreg.; bids soon; Stevens & Koon, Portland, Oreg., designing engineers.

Strip Steel

Strip Prices, Page 65

Pittsburgh—Strip steel producers last week were preparing to open first-quarter books at unchanged levels. All present prices on stainless steel strip have also been reaffirmed. The average of operations in strip mills last week advanced to a 55 per cent level for hot-rolled and 60-65 per cent on cold-rolled.

Cleveland — Heavy orders are being received from automobile manufacturers for steel strip and production here continues at capacity. Miscellaneous demand is light.

Chicago—First quarter strip prices will be unchanged from present levels despite previous expectations of an advance. Specifications recently have been heavier, stimulated by the prospect of higher prices though consumption also has been well maintained. Mills have backlogs of several weeks and cancellations of existing tonnages are expected to be few.

Boston—Strip specialties show an improvement, mostly in narrow widths with operations over 75 per cent. Buying is widely diversified.

New York—A reduction in strip specifications is looked for over the remainder of the year, with prices reaffirmed and with the novelty requirements of the holiday trade now well supplied. Principal support at present is tonnage from the automobile accessory trade, with little or no let-up in sight.

Wire

Wire Prices, Page 65

Cleveland — Specifications for manufacturers wire hold to their recent averages, which are seasonally heavy. District sales offices have been notified that there will not be an advance immediately for second quarter and books will be opened Dec. 2 without price change.

Boston—Buying of wire is heavier and more diversified, specialties and manufacturers wire leading. There is a good movement of light power wire for electric household installations. Wire rope has picked up materially, largely for industrial purposes.

Pittsburgh—In spite of the announcement two weeks ago that wire rods would be advanced $2 a ton for first quarter, both merchant and manufacturing wire consumers last week were advised that there would be no change on finished wire products for the first quarter of 1936. Heavy demand continues for wire products, with buying from makers of bed springs an outstanding feature. Allegheny county is asking separate and sealed proposals until Dec. 10 on annealed wire, nails, spikes, and reinforced cement concrete pipe; Robert G. Woodside is county controller.

Mesta Machine Co., West Homestead, Pa., has declared a regular quarterly 50-cent common stock dividend, payable Jan. 7 to Dec. 16 record.

TITAN BRASS AND BRONZE FORGINGS—BRASS AND BRONZE FORGINGS—BRASS AND BRONZE FORGINGS—BRAS
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The Titan mills, located at Bellefonte, Pennsylvania, are economically situated to serve the brass and bronze needs of the 40,000,000 people located within a radius of 300 miles—from Hartford in the East to Detroit, and from Rochester, New York, to Richmond, Virginia, Titan products have built up a long list of satisfied customers.

Dealing with Titan has a distinct advantage in the flexibility of service offered. Titan readily meets special requirements and special schedules.

Let Titan quote on your next order.

Titan Metal Manufacturing Company
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Shapes

Structural Shape Prices, Page 64

New York—Frederick Snare Corp. is low bidder for the Seventy-ninth street grade elimination and structures, New York, requiring 4600 tons. Revised bids are expected shortly on the New Jersey approach to the Triboro, New York, bridge, and on a New York section of an elevated highway, the latter taking 12,400 tons.

Orders for fabricated structural steel booked during October were 12 per cent larger than the monthly average for 1935, according to reports received by the American Institute of Steel Construction. Shipments were approximately equal to the monthly average of the year. Production during October was at the rate of 32.2 per cent of normal, normal being the yearly average for the years 1928 to 1931 inclusive.

Pittsburgh — American Bridge Co. has entered an order for 1000 tons the past week for a Southern Pacific railroad bridge at Guadaloupe, Calif. Otherwise, the market is slow, the only highlights being state bridge work and the first of the federal grade crossing elimination jobs. Among new inquiry is 800 tons for department of agriculture lookout towers and 600 tons for a brewery at Detroit. Plain shapes remain 1.80c, base Pittsburgh, for first quarter.

Cleveland — The number of new public projects being figured is increasing rapidly. Thirty-seven grade eliminations now are before fabricators here, who estimate total steel requirements at 7000 to 10,000 tons. Approval of federal aid for construction of school buildings also is being accelerated. Much of this work will not reach the steel delivery stage until next year. Awards include 245 tons for Cleveland's easterly sewage disposal plant, contract No. 88, and several small industrial jobs.

Preliminary sketches are being made for the state bridge at Gates Mill, O., which fabricators estimate will require 6000 to 10,000 tons of structural steel. The project is assured, but specifications may not be ready until some time in 1936. Also, the material has not been decided definitely, although from the topography of the district fabricators believe it will be structural steel.

Chicago — A federal grant makes possible immediate resumption of work on the outer drive bridge and viaduct here. While steel for the main bridge was placed several years ago, about 16,000 tons additional will be required for the remainder of this project. Bids are to be taken by the Chicago park board in the near future. Secretary Ickes' statement that 3300 tons of piling for the Miami, Fla., dock would go to the producer with the largest freight rate from Miami, apparently allocates this material to Inland Steel Co. which, on the original letting, was to receive only a small portion of this tonnage, the bulk going to Jones & Laughlin Steel Corp. New bridge inquiries continue heavy, including 1100 tons in Nebraska, 825 tons in Illinois, 650 tons in Iowa and 425 tons in Kansas.

Boston—Additional schools and

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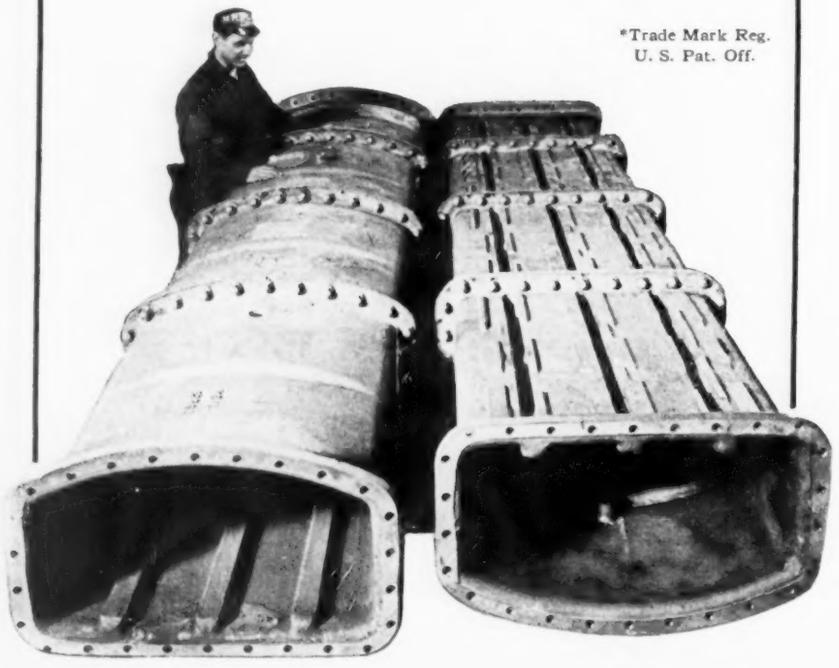


Shape Awards Compared

	Tons
Week ended Nov. 30	21,229
Week ended Nov. 23	12,209
Week ended Nov. 16	19,795
This week, 1934	32,175
Weekly average, 1934	16,284
Weekly average, 1935	16,412
Weekly average, November.	18,746
Total to date, 1934	826,841
Total to date, 1935	804,170

bridges are up for bids in most New England states. Several hundred tons have been placed for Vermont.

Philadelphia—Approximately 1800 tons of shapes are required for eight Philadelphia schools. Shape prices have ben reaffirmed.

St. Louis—The Kansas City Bridge Co., Kansas City, Mo., has been announced as the low bidder for construction of a new highway bridge over the Missouri river at Weldon Springs, near St. Louis. The Kansas City company submitted a bid of $1,221,670. This job will require 4239 tons of structural shapes, 137 tons of reinforcing bars and 6530 lineal feet of steel piling.

San Francisco — Demand for shapes has shown a decided increase during the past few days due to the fact that a large number of grade separation projects in Oregon, Washington, California and Montana have been released for figures. California will take bids on 16 crossings, involving over 3750 tons.

Shape Contracts Placed

4725 tons, Brooklyn college buildings, Brooklyn, N. Y., to McClintic-Marshall Corp., Bethlehem, Pa.

4600 tons, piling, Illinois river dock, Peoria, Ill., to Inland Steel Co., Chicago.

3370 tons, piling dock, Miami, Fla., to be awarded to producer with highest freight rate from Miami (Inland Steel Co., Chicago). Reported Sept. 30 as divided among Inland, Jones & Laughlin Steel Corp., Pittsburgh, Carnegie-Illinois Steel Corp., Pittsburgh, and Kalman Steel Corp., Bethlehem, Pa.

2600 tons, bridges in connection with depressed tracks, New York Central railroad, New York, to American Bridge Co., Pittsburgh; through George J. Atwell Foundation Co.

850 tons, public school No. 166, Long Island City, N. Y., to Harris Structural Steel Co., New York; through John Kennedy Co.

820 tons, Texas state highway bridge, Marble Falls, Tex., to Virginia Bridge & Iron Co., Roanoke, Va.

675 tons, highway bridge, Hulbert, Wagoner county, Oklahoma, to Virginia Bridge & Iron Co., Roanoke, Va.; through L. M. Mackay, Britton, Okla. Reinforcing bars to Concrete Engineering Co., Omaha.

605 tons, building, Michigan Alkali Co., Wyandotte, Mich., to R. C. Mahon Co., Detroit.

475 tons, bridge, Chetopa, Kans., to Missouri Valley Bridge & Iron Co., Leavenworth, Kans.

375 tons, state highway bridge, Hasion, Tex., to Virginia Bridge & Iron Co., Roanoke, Va.

350 tons, bridge, Logansport, La., to Virginia Bridge & Iron Co., Roanoke, Va.

325 tons, building, Forest Park, St. Louis, to Superior Structural Steel Co., St. Louis.

310 tons, bridge, Battle Creek, O., to unstated fabricator; through H. G. Christman, Lansing, Mich., general contractor.

300 tons, postoffice, Tallahassee, Fla., to Ingalls Iron Works, Birmingham, Ala.

285 tons, addition to plant, Worthington Pump & Machinery Corp., Buffalo, to McClintic-Marshall Corp., Bethlehem, Pa.

280 tons, power plant for New York university, 181st street, New York, to Bethlehem Fabricators Inc., Bethlehem, Pa.

265 tons, high school, Newburyport, Mass., to Pittsburgh-Des Moines Steel Co., Pittsburgh.

250 tons, conveyors, Corinth, Miss., to Worden-Allen Co., Milwaukee.

245 tons, 145 tons shapes, and 100 tons miscellaneous steel, easterly sewage disposal plant, contract No. 88, Cleveland, to Republic Structural Iron Works, Cleveland.

255 tons, state highway bridge RC 2627, Dutchess county, New York, to Harris Structural Steel Co., New York; through Thomas A. Brogan, Yonkers, N. Y.

215 tons, St. Mary's catholic school, Flushing, L. I. to Devee Iron Works; through Patrick Construction Co.

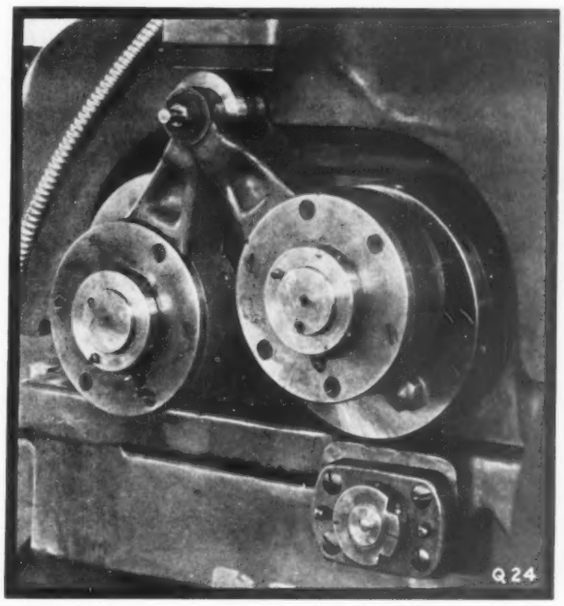
200 tons, Tuberculois hospital, Washington, to Barber & Ross Inc., Washington; through Walter Kidde Constructors Inc.

185 tons, state highway bridge, Miles City, Mont., to Minneapolis-Moline Power Implement Co., Minneapolis.

170 tons, state underpass, Kenton county, Kentucky, to Virginia Bridge & Iron Co., Roanoke, Va.

163 tons, state bridge, Wasco county, Oregon, to unnamed interest.

160 tons, alteration to University high



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182

LANDIS TOOL CO.
WAYNESBORO, PA.

school, Los Angeles, to Pacific Iron & Steel Co., Los Angeles.

140 tons, building, Loose, Wiles Biscuit Co., Dayton, O., to Pittsburgh Bridge & Iron Works, Rochester, Pa.; through H. K. Ferguson Co., Cleveland.

135 tons, alterations and additions, Lehigh Portland Cement Co., Fordwick, Va., to Roanoke Iron & Bridge Co., Roanoke, Va.

125 tons, Garfield school, Long Beach, Calif., to Minneapolis-Moline Power Implement Co., Minneapolis.

120 tons, bridge at Hand, near Dearborn, Mich., to Whitehead & Kales Co., Detroit.

120 tons, bridge, for Grand Trunk Western railway, Flint, Mich., to McClintic-Marshall Corp., Bethlehem, Pa.

115 tons, two buildings for International Graphite & Electric Co., Niagara Falls, N. Y., to Rogers Structural Steel Co., Corry, Pa.

115 tons, shapes and plates, elevated tank, Madison Heights, Va., to Chicago Bridge & Iron Works, Chicago.

111 tons, four bridges, Sheridan and Campbell counties, Wyoming, to unnamed interests.

100 tons, I-beams for tunnels, specification 1810, Los Angeles, to Youngstown Steel Car Corp., Niles, O.

164 tons, state viaduct at Mossmain, Yellowstone county, Montana, to unnamed interest.

100 tons, state undercrossing near Kalispel, Flathead county, Montana, to unnamed interest.

100 tons, state undercrossing, Lyon county, Nevada, to unnamed interest.

100 tons, or more, underpass, Birmingham-Bessemer, Ala., highway, to Virginia Bridge & Iron Co., Roanoke, Va.; through Southern Construction Co.

Shape Contracts Pending

16,000 tons, outer drive viaduct, Chicago park board to take bids shortly.

4600 tons, Seventy-sixth street grade elimination and structures, New York; Frederick Snare Corp., New York, low for general contract.

1557 tons, tunnel supports, bridge steel, gates, etc., Casper-Alcova project, Wyo.; bids in.

1200 tons, Chelsea Creek, Boston; bids being taken.

1100 tons, state bridges, Nebraska.

910 tons, pumping units, specification 133, metropolitan water district, Los Angeles; Winston Bros., Los Angeles, low on general contract at $1,731,781.

825 tons, state bridges, Illinois.

800 tons, lookout towers, various locations, for department of agriculture, Washington.

650 tons, state bridges, Iowa.

600 tons, brewery, Detroit, for Koppie-Melchers Inc.

600 tons, grade eliminations, New York state.

500 tons, coal washer, Harrisburg, Ill.

450 tons, state bridges, North Dakota.

450 tons, grade elimination, Santa Fe railroad.

425 tons, state undercrossing, Charter Way, Stockton, Calif.; bids Dec. 10.

425 tons, bridge, Wakefield, Kans.

368 tons, piling and miscellaneous metal, Bull Lake dam, Wyoming; bids to reclamation bureau, Riverton, Wyo., Dec. 7.

338 tons, state undercrossing on Main street, Salinas, Calif.; bids Dec. 10.

334 tons, state undercrossing, Soledad, Calif.; bids Dec. 10.

320 tons, shapes and machinery, Spokane, Wash., hydro-electric plant; Phillips & Davies Mfg. Co., Kenton, O., low.

310 tons, bridges, Morgantown and Milltown, W. Va., for state highway department.

300 tons, state highway construction, New Jersey; bids Dec. 4.

288 tons, state undercrossing, Famoso, Calif.; bids Dec. 10.

275 tons, addition to Krug Baking Co. plant, Brooklyn, N. Y.

275 tons, dye house, Ansel, Md., for Celanese Corp. of America.

235 tons, state undercrossing, Army street, San Francisco; bids Dec. 11.

235 tons, state undercrossing, Lafayette street, Santa Clara, Calif.; bids Dec. 11.

230 tons, state undercrossing, Firestone boulevard, Los Angeles; bids Dec. 13.

190 tons, state undercrossing, Washington avenue, San Leandro, Calif.; bids Dec. 11.

171 tons, state bridge, Thurston county, Washington; bids in.

171 tons, state bridge in Stanislaus county, California; bids Dec. 10.

160 tons, state undercrossing, Red Bluff, Calif.; bids Dec. 11.

150 tons, state crossing, Northam Station, Calif.; bids Dec. 12.

114 tons, undercrossing, Humboldt county, Nevada; general contract to Nevada Rock & Sand Co.

114 tons, state under crossing, Broad-

Behind the Scenes with STEEL

Answer

THE question has been asked us: "Why, in view of the fact that the name of your magazine is STEEL and that it is supported strongly by the various units of the steel industry, do you devote any attention to competing materials, such as aluminum, brass, plastics, copper, etc?"

That's a fair question, we suppose, but it has a very simple and logical answer. STEEL's editorial job is one of supplying information, of telling the story on what is happening in iron, steel and metalworking industries. While steel is a material basic to all industry, its use is associated closely with that of scores of other materials—sometimes in a complementary sense, sometimes competitively.

Certainly the steel producer is going to be better off, both from an operating and a financial standpoint, if he is fully informed about what is currently being accomplished with these associated materials. Such information helps to show him how to perfect and improve his products, to capitalize upon the opportunities afforded by the auxiliary relations existing between steel and these other materials, or to meet the challenge if that relationship happens to be one of competition.

Furthermore, if the columns of STEEL were closed to everything but articles on the production, processing, fabrication and use of steel alone, then our 50,000 readers, many of whom daily use nearly all forms of metals and allied materials, would not be given the industrial picture in its true light.

"Give light and the people will find their own way," as Mr. Scripps and Mr Howard so aptly put it.

* * *

Abroad

IF YOU are a native of Jamshedpur, India, although chances are you are not, you may wonder why your yearly subscription price to STEEL is "two pounds nupence" or $9.90 American cash money. We asked our vice president in charge of why things cost so much about this and he replied, "Postage, my dear boy, postage."

It costs from $5 to $7.50 per year to mail copies abroad, considerably in excess of postage for domestic copies. By the time you add to this amount the customary administrative, clerical, handling and other charges, foreign subscribers probably owe us money.

A Los Angeles oil well equipment interest recently air-mailed an inquiry for quotations on a five-year foreign subscription, paid in advance. Unfortunately, no concessions can be made on this sort of business, so we had to tell them $49.50.

* * *

Rambler

SPORTS writers have a way with them, and John Kieran of the *New York Times* is no exception. In a recent edition he made a football game prediction which certainly strikes a new high. Here is what he said, before the game, verbatim:

Notre Dame vs. Southern California—Recipe for cooking up a gram of radium: Take about 40,000 tons (roughly) of carnotite ore, treat with 500 tons of assorted chemicals, add 10,000 tons of distilled water, heat over a slow fire furnished by 1,000 tons of coal and don't stick a fork in the finished product to see whether it is done or not. The Belgian Congo had practically a monopoly on radium-bearing ore production for some years and forced the price up. But the discovery of pitchblende deposits in the Bear Lake region in Canada opened up the market and forced the price all the way down to about $50,000 a gram. Subject to correction later, one priceless vote for Notre Dame.

Well, it does take a lot of writing to fill up those newspaper columns. At least he picked the winner, when he finally got to it.

* * *

Big Business Writes

NO LACK of letters and cards this week, but there is one that really deserves more than passing mention. It hails from R. L. Beasley Inc. at Dothan, Ala. Some of you salesmen will do well to glom onto this matter, for Mr. Beasley Inc. is a buyer, chafing at the bit. He writes:

"I'm in the market for air compression machinery made for attaching to areaplanes, motors & other Engines built up to fire Engine & Pump Practice & light as Posable from 50 to 1000 lbs. air Pressure the fastest way—millions needed."

We think he has hold of something pretty good. If he has any stock available at a reasonable price, we'd be glad to take over about 50 to 1000 shares—the fastest way.

—SHRDLU

way Terrace, Oakland, Calif.; bids Dec. 10.

108 tons for education building, University of Missouri, Dickie Construction Co., St. Louis general contractor.

105 tons, postoffice, Salinas, Calif.; Frank J. Reilly, San Francisco, low on general contract.

100 tons or more, state bridge Jackson county, Oregon; bids in.

Reinforcing

Reinforcing Bar Prices, Page 65

New York—While the larger pending projects have been placed, including several thousand tons last week, a fair volume of business still is pending. Awards include 580 tons for the procurement division of the treasury department, New York.

Pittsburgh—The federal railroad grade crossing elimination program is now coming out for bids and reveals heavy potential requirements for reinforcing steel bars. Leading among present inquiries is one at Rensselaer, N. Y., for the New York Central and Boston & Albany roads. The market is quoted 2.05c, carload lots, cut lengths, on plain reinforcing bars by distributors. Arthur G. McKee & Co., Cleveland, has been awarded general contract to build the Carnegie-Illinois Steel Corp.'s Homestead, Pa., plate mill foundations, which will require about 400 tons of reinforcing steel.

Cleveland — Concrete bar fabricators are busier than at any other time this year estimating public works projects, more than one hundred of which have been approved recently in this state for federal aid. These include grade eliminations, and in many instances it has not been decided whether structural steel or concrete will be used, or the proportions. The outlook is for a good demand for bars early in 1936. Currently, awards for public and private work are light.

Chicago—More than 10,000 tons of concrete bars are pending for major jobs in this district. The largest of these is 6000 tons for the Chicago outer drive extension and viaduct on which work is proceeding as a result of a federal grant. Awards include 800 tons for the Milwaukee housing project. New bids have yet to be taken on Chicago sanitary district work involving 1700 tons, while it is likely that new bids also may be asked for on the Oak Park sewers requiring 750 tons. Concrete bar prices are being extended into first quarter at recent levels.

Boston—Pending reinforcing work is down slightly, following the award of several of the most attractive projects in New England. Several hundred tons for bridges, schools and housing developments continue active. Prices are steadier.

Philadelphia—School work dominates reinforcing bar demand, with eight Philadelphia schools up for bids Dec. 11, requiring a total of 1600 tons, and 20 to 30 more small schools active in eastern Pennsylvania.

San Francisco—Over 40 projects are now up for figures involving an aggregate of more than 48,000 tons of reinforcing bars. Of special interest is the call for bids by the United States engineer's office, Los Angeles, under proposal 238, to be opened on

Concrete Awards Compared

	Tons
Week ended Nov. 30	2,985
Week ended Nov. 23	4,935
Week ended Nov. 16	3,640
This week, 1934	1,997
Weekly average, 1934	4,084
Weekly average, 1935	6,813
Weekly average, November	7,369
Total to date, 1934	206,821
Total to date, 1935	333,844

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Uncle Sam's "watch dogs" are now using the new "AW" Super-Diamond Pattern! A typical choice—emphasizing the desire to provide the Navy with every safeguard. For "AW" floor plates *are* safe—and permanent.
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Dec. 5, for 15,137 tons. Morrison-Knudsen Co. Inc., Utah Construction Co. and Winston Bros., San Francisco, are low bidders on the desilting works for the All-American canal system, Yuma, Ariz., requiring the placing of 9128 tons of bar, 2700 tons of sheet steel piling and 1400 tons of shapes for gates and trash racks.

Seattle — The market is more active than it has been for a year as new specifications are coming out in increasing volume. Federal-financed construction, particularly for new schools and additions, call for a heavy total of concrete bars, although individual jobs require small tonnages. Pacific Coast Steel Corp., Seattle, has been awarded 1100 tons for the Nisqually, Wash., state bridge.

Reinforcing Steel Awards

1100 tons, state bridge, Nisqually river, Washington, to Pacific Coast Steel Corp., Seattle; Rumsey & Co., Seattle, general contractor.

800 tons, Milwaukee housing project, to Concrete Steel Co., Chicago.

585 tons, procurement division of the treasury department, New York. 460 tons to National Bridge division of Jones & Laughlin Steel Corp., Pittsburgh; 125 tons to Igoe Bros., Newark, N. J.

200 tons, Teachers' college classroom and library, Alva, Okla., to Concrete Engineering Co., Omaha, Nebr.

100 tons, highway work in Converse, Fremont and Sheridan counties, Wyoming, for state, to unnamed interests.

100 tons, alteration to University high school, Los Angeles, to unnamed interest.

100 tons, state highway work in Ventura and Riverside counties, California, to unnamed interest.

Reinforcing Steel Pending

15,137 tons, proposal 238, United States engineer's office, Los Angeles; bids Dec. 5.

9128 tons, placing, desilting works, All-American Canal System, Yuma, Ariz.; Morrison-Knudsen Co. Inc., Utah Construction Co. and Winston Bros., San Francisco, low on general contract at $4,374,240.

7850 tons, specifications 134, metropolitan water district, Los Angeles; bids Dec. 10.

6000 tons, outer drive viaduct, Chicago.

755 tons, pumping units, metropolitan water district, Los Angeles, specification 132; Winston Bros., Los Angeles, low on general contract at $1,731,781.

726 tons, Seventy-ninth street grade elimination, New York; Frederick Snare Corp., New York, low for general contract.

400 tons, Sunshine Bueana Vista school, San Francisco; Anderson & Ringrose, San Francisco, low on general contract.

400 tons, foundations to Carnegie-Illinois Steel Corp.'s plate mill, Homestead, Pa.; Arthur G. McKee Co., Cleveland, general contractor.

300 tons, or more, three city bridges, Seattle; bids in.

250 tons, state undercrossing, Charter Way, Stockton, Calif.; bids Dec. 10.

225 tons, arch concrete span, for Tacoma, Wash.; bids Dec. 4.

210 tons, state undercrossing, Famoso, Calif.; bids Dec. 10.

150 tons, state undercrossing, San Leandro, Calif.; bids Dec. 11.

100 tons, state undercrossing, Broadway Terrace, Oakland, Calif.; bids Dec. 10.

100 tons, or more, 501 foot overpass Boundary county, Idaho; Colonial Construction Co., Spokane, Wash., general contractor.

100 tons, or more, underpass Nez Perce county, Idaho; G. D. Lyon & Co., Spokane, Wash., general contractor.

100 tons, or more, overpasses in Klamath and Lane counties, Oregon; bids in.

100 tons or more, six concrete spans in Montana; bids in.

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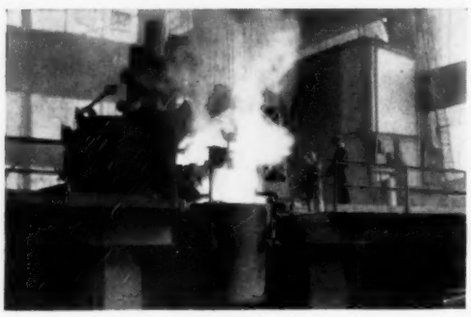

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IRVINE, WARREN COUNTY, PENNA., U. S. A.

Pig Iron

Pig Iron Prices, Page 66

Pittsburgh—The coke shortage which had forced banking of the Davison Coke & Iron Co.'s Neville Island, Pa., merchant furnace, has been relieved and the blast furnace once again is in operation. Shipments against a number of important contracts negotiated in late October are proceeding at a heavy rate. Nominally, the market is $19, Pittsburgh district furnace, for basic iron, $19.50 for foundry grade, and $20 for bessemer iron. No test has been given these prices as yet.

Cleveland — Pig iron shipments are increasing their lead over October, and besides heavy automotive releases, a strong demand is apparent from agricultural implement, heating equipment and machinery manufacturers. Producers report December will show a still higher rate of shipments, as present contract tonnages must be moved by Jan. 1 when the advance of $1 a ton will apply on all new business.

Chicago — November shipments were about 30 per cent ahead of October, with an even larger increase in prospect for December in order to complete shipments against orders now on books. First quarter books will be opened Dec. 2, and despite some coverage by consumers of requirements during the early part of first quarter, a number of buyers have indicated intentions of entering new contracts promptly for first quarter delivery. In some instances, purchases which had been intended to accommodate future needs have been found inadequate, hence new business is expected to appear sooner than was anticipated. The market on first quarter business is $19.50, furnace, for No. 2 foundry and malleable.

Boston—Domestic buying is light, but at firm prices. More foreign iron is in storage than for some months, there being piles at Boston, Providence, R. I., and Bridgeport, Conn. The price for this material, with one exception, is 50 cents to $1 under domestic quotations.

New York—Shipments are being well sustained, with a further increase expected in December, in view of the anticipatory buying in October prior to the price advance. Meanwhile, new orders have been light and the trend in foundry production appears slightly downward. At the present rate of consumption,

most foundrymen expect to carry over into next year about two months' supply of pig iron.

Philadelphia — Sellers are now opening their books for the first quarter, but expect little new tonnage for the present. Specifications against old contracts this month are expected to be heavy.

Buffalo—November was one of the best months of recent years in shipments from merchant furnaces of this area. Rail, lake and canal were used to move tonnage, which was in excess of the month's production. Consumers are taking deliveries freely on old orders, and little cancellation will be necessary at the end of the quarter. The present market is inactive, as consumers are well covered.

Cincinnati—Shipments during November were somewhat heavier than in October, but much iron remains on contracts dated before the price rise, and the movement in December is expected to exceed that of any month this year. With exception of a tapering of the stove melt, foundries show unchanged or improved output. Current sales are not large.

St. Louis—While the melt in this area is well sustained, it is hardly keeping pace with shipments, the total of which for November promises to be the largest for that month in recent years. Indications point to deliveries during December being larger than those in November.

Birmingham, Ala.—An active market is seen for the remainder of the year, and production and delivery will be steady. No hampering of market is believed to have been occasioned by the advance in base price, but up to $15.50 for No. 2 foundry. This price will obtain on first quarter contracts. Eleven blast furnaces are active.

Toronto, Ont.—Business is continuing steady, and is having a stimulating effect on merchant pig iron sales. Demand is holding around its peak for the year, with awards running between 700 and 1000 tons weekly. While principal demand is for foundry iron, there has been general improvement in sales of malleable iron recently. Prices are firm.

Scrap

Scrap Prices, Page 67

Pittsburgh — December railroad lists to be sold this week will provide an important test, with the Baltimore & Ohio offering 1100 tons of melting steel, 800 tons of scrap rails, and 600 tons of uncut structural steel Dec. 2, and other lists following throughout the week. With several district mills increasing commitments for No. 2 grade, the market has advanced 25 cents a ton on both No. 2 heavy melting steel and bundled sheet scrap, both of which are quoted $12.50 to $13 in this district. Owing to scarcity, railroad malleable scrap is up 50 cents a ton to $16.25 to $16.75, but scrap rails are weaker and are quoted $14 to $14.50. No change has occurred in No. 1 heavy melting steel, machine shop turnings or blast furnace scrap. Pennsylvania railroad closes bids Dec. 4 on 47,000 tons including 23,000 tons No. 1 heavy melting steel and 10,000 tons of axles.

Cleveland—Iron and steel scrap in the northern and eastern Ohio centers today has advanced some prices and reduced others. New buying has not picked up much in volume, but prices are much stronger.

Chicago—Scrap continues strong and sellers continue to pay between $13.50 and $14 for heavy melting steel in covering previous sales to mills at $13.50 and less. While

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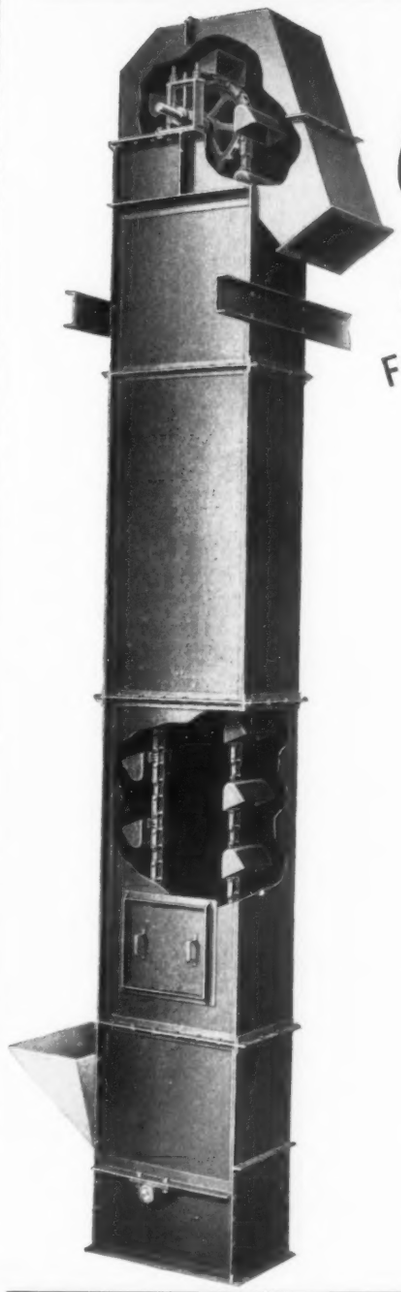

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open-hearth operations recently have been at a nine-month peak, a decrease in scrap shipments has developed because of the shutdown of 10 units by a leading interest this week for mill changes. Scrap is coming out in moderate volume but has been insufficient to exert a weakening effect upon prices.

Boston—Last sales of heavy melting steel at Worcester were $1.50 for No. 1 and $1 for No. 2 below former prices. It is doubtful if the domestic price at consuming point could be bettered. Dock prices are unchanged at $9.75 to $8.75 which precludes any movement of scrap from the immediate Boston district to Worcester. The latter is buying in lots of 1000 tons or more, partly from Springfield, Mass.

New York—Movement of heavy melting steel in northern New Jersey for recent Pennsylvania delivery is light. Export business commands most attention but sellers are uncertain, there being some federal pressure against further sales to Italy. Japan is buying but little new business is being booked. Cast grades for nearby delivery are higher, including No. 1 machinery, for which brokers pay $8.50 to $9. Mixed borings and turnings are also stronger, up 50 cents. The market is not active.

Philadelphia—No. 1 heavy melting steel is higher at $12 to $12.50 with dealers offering $12 for delivery against $12.50 orders, Coatesville, Pa. Other grades are unchanged. The Pennsylvania is offering to sell 10,000 axles and 23,000 tons of No. 1 heavy melting steel. As the latter is about double the usual offering the trade is inclined to believe the tonnage represents a portion of the large car scrapping program recently announced.

Buffalo — Scrap markets have turned definitely higher, at least in dealers' asking prices. A recent sale at $10.75 for No. 2 heavy melting steel has caused dealers holding large tonnage to reaffirm their belief that No. 1 heavy melting steel is worth $12 or more. A local consumer, offering $11 for No. 1 material, has found no tonnage, the trade claims. Stocks now on hand in the larger works are believed sufficient to last about 60 days, having been expanded sharply in the closing days of the 1935 navigation season.

Detroit—Although iron and steel scrap prices are unchanged, the undertone is extremely strong. An increasing volume of scrap is being offered by automobile and parts manufacturers but it is being quickly absorbed.

Cincinnati—The iron and steel scrap market has a strong undertone, quotations being unchanged. Mill pressure on prices may be emphasized by absence of an anticipated increase in mill products quotations for next quarter.

Birmingham, Ala.—Old material market showed a slight improvement as production was speeded up during the past week. Heavy melting steel is firm and larger consumers are buying frequently but not in large tonnages. Other items on the scrap list are moving fairly well.

St. Louis—The general complexion of the market for iron and steel scrap has changed little during the past two weeks. Steel grades are decidedly strong, being influenced by scarcity and higher prices at Chicago and other points to the east. Buying is still at a minimum, but dealers look for increased activity during the early weeks of December, basing this view on diminishing mill stocks.

Seattle — Although the market is slightly softer, in view of lack of export demand, prices are being sustained by continued domestic buying. Japan shows no interest at present levels and is evidently hoping for a decline. Quotations for No. 1 scrap are $9.75 gross and $11 for rails.

Toronto, Ont.—Trading in iron and steel scrap shows little change for the past week. Melters are taking supplies in good tonnage and there is a steady demand for steel grades. Local dealers state that shipments of heavy melting steel to the Hamilton district are going forward at regular intervals, while other Ontario consumers, especially around Toronto are showing more interest in scrap requirements. Montreal dealers also report a growing demand for steel scrap. Prices are firm and unchanged.

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Warehouse

Warehouse Prices, Page 68

Cleveland — While mill business is increasing, orders from warehouses are declining in number and tonnage. One explanation advanced for this is that consumers are showing confidence and buying more from producers. Warehouse prices are steady.

Chicago — Sales so far this month have shown only a small decrease from the October rate, and in some instances have improved. Prices are expected to continue at current figures, in view of the extension of mill quotations.

Philadelphia—Iron and steel warehouse business in November was slightly off from the October level.

Detroit — Warehouse business in iron and steel continues at a seasonally good level, but shows a moderate recession in the recent brisk activity. Prices are unchanged.

Cincinnati—Sales from warehouse showed moderate improvement during the past two weeks, principally due to more frequent ordering from industrial sources. Prices are unchanged.

Seattle — Seasonal influences are apparent in reduced buying. Volume has dropped and business is in small lots. Sellers do not expect much pick-up before Jan. 1. Prices are steady.

St. Louis—Business is holding up fairly well, though in somewhat smaller volume than during the first

half of November. Volume for the month will compare favorably with that for the like period in 1934. Advanced prices have not as yet been reflected in warehouse quotations.

Iron Ore

Iron Ore Prices, Page 67

Receipts of Lake Superior iron ore at Lake Erie ports in October totaled 3,162,468 tons, compared with 1,761,215 tons in October, 1934. Receipts for the season to Nov. 1, shipments for the season for the season from Lake Erie docks, and dock balances Nov. 1 follow:

	Receipts	Shipments	Dock bal. Nov. 1,'35
Buffalo	1,856,618	2,345	2,570
Erie	958,038	986,139	75,605
Conneaut	3,290,849	3,172,734	1,826,740
Ashtabula	2,656,298	2,113,185	1,832,489
Fairport	738,510	744,922	387,085
Cleveland	5,008,834	3,692,677	775,300
Lorain	2,041,028	1,078,487	12,527
Huron	722,061	612,386	429,245
Toledo	1,145,983	586,753	17,107
Total	18,418,219	12,989,629	5,358,668
Year ago	15,143,854	10,797,599	5,284,816

Receipts for the season at other ports:

	Tons
Detroit	969,517
Indiana Harbor	1,366,771
Gary	1,840,929
South Chicago	2,877,963
Sault Ste. Marie, Ont.	224,468
Hamilton, Ont.	298,655
Total	7,578,303
One year ago	6,073,981

New York—Further heavy arrivals of foreign ores at Baltimore are reported in October, including 43,000 tons of Chilian ore, 14,600 tons of Australian manganiferous ore, 7900 tons of Russian iron ore, and 4500 tons of Cuban manganese ore. Since the first of July about 404,200 tons of ore have come in at Baltimore, possibly the heaviest movement in several years.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 65

Specifications for bolts, nuts and rivets have been tending upward in spite of light buying by jobbers, and December is expected to continue the trend. In the Chicago area railroad demand is accountable for much of the improvement, with farm implement builders and miscellaneous users buying steadily. Structural fabricators are taking somewhat larger lots of rivets.

Specifications have now been received by bolt and nut manufacturers at Cleveland from leading automobile manufacturers covering shipments for all of December, and volume is said to be equal to that of any July on record from these consumers. Preparations evidently are being made for a substantial gain in automobile production. Delivery dates on wire and wire rods from mills have lengthened to three weeks. Demand from other consuming lines is relatively quiet.

Buffalo Bolt Co., North Tonawanda, N. Y., is low bidder at $1431.27 on 6000 1½ x 5¼-inch steel bolts, complete with nuts, for land pipe for Fort Peck, Mont., dredges.

Semifinished

Semifinished Prices, Page 65

Pennsylvania railroad is asking for bids Dec. 9 on 10,000 net tons of scrap axles, Pennsylvania railroad specifications 10-H and size of journal, 5½ inches x 10. This material is occasionally considered excellent stock for forgings.

A number of large users of rerolling billets, blooms, slabs, and sheet bars placed orders last week to increase their stocks through December, because of the advance of $2 a ton on all these products, to become effective Jan. 1. Owing to this speculative buying, as well as actual requirements for current rolling schedules, December's shipments are expected to be the heaviest of any month this year.

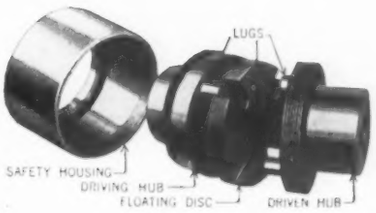
Tin Plate

Tin Plate Prices, Page 64

Pittsburgh—The leading tin plate producer on Nov. 26 announced its 1936 contract price on tin plate as $5.25 per base box, Pittsburgh. This is an unchanged price from the market in 1935, and in fact is a continuation of an unchanged market since Dec. 1, 1933, when the price was advanced from $4.65. All other tin mill products are unchanged in price for the first quarter of 1936, with the market on tin mill sizes of black sheets at 2.75c, base, Pittsburgh, for 28 gage, and No. 24 unassorted long ternes, 3.40c, Pittsburgh.

New York—Specifications for current needs continue in excess of normal for this time of the year. Significant of expansion in some important lines is the statement by the Continental Can Co. that the company's output of motor oil cans in 1935 will be at least 30 per cent above that of last year. Trade estimates are that next year will see a

A New Coupling!



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4. Highest efficiency even at maximum misalignment.
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6. Parallel misalignment 1/16″ to 3/16″.
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8. Minimum protection needed against grit, dirt or water.
9. Durable safety covers.
10. Adds astonishingly to bearing and motor life.
11. Silent at all speeds.
12. Neat and trim in appearance.

ALLOY PRODUCTS CORP.
Waukesha, Wis.

further increase in this type of production.

Ferroalloys

Ferroalloy Prices, Page 66

New York — Announcement of first quarter prices on ferromanganese and spiegeleisen is expected momentarily. Signing of the Brazilian treaty by President Roosevelt is being awaited by the ferromanganese producers before going ahead and action by the ferromanganese producers is being awaited by the sellers of spiegeleisen. At least that appears to be the general situation.

Interest of the ferromanganese producers in the Brazilian treaty centers on the scheduled reduction in manganese ore which is an important factor in calculating the reduction in tariff on ferromanganese Jan. 1, when the Canadian reciprocal treaty goes into effect with its revision in the Canadian tariff on ferromanganese. Sellers express little doubt the President will sign the Brazilian treaty, but until this is actually done, ferromanganese sellers are disposed to hold off.

The scheduled reduction in manganese ore under the Brazilian treaty is 50 per cent and will become effective 30 days after the signing of the treaty by the President. Figuring in this reduction the new duty on ferromanganese, under the combined operation of the Brazilian and Canadian treaties, will be $17.92, as against import duty of $3.60, as noted in last week's issue.

Other factors also considered in the establishment of prices for next quarter include the trend in manganese ore prices, exclusive of duty. The general belief is, however, that notwithstanding any upward revisions in manganese ore prices, there will be a reduction in ferromanganese.

In view of the close relationship which normally exists between ferromanganese and spiegeleisen, sellers of the latter are marking time for the present. Nevertheless, they point to increased costs, including about a 75-cent increase in the price of coke per ton of spiegeleisen produced as factors likely to offset any drastic reduction at this time. Meanwhile, domestic spiegeleisen, 19 to 21 per cent, is $26, Palmerton, Pa., on lots up to 50 tons, and $24, on 50 tons and over. Ferromanganese is $85, duty paid, Atlantic and Gulf ports.

Steel in Europe

Foreign Steel Prices, Page 68

London—(*By Radio*)—The Comptoir Siderurgique, which has control of French steel trade, has been renewed for five years, assuring stability in the French industry and continuance of improved marketing conditions.

Trade in British pig iron is quieter but the market is strong. Dorman, Long & Co. is starting an additional blast furnace on basic iron. Steelworks and rolling mills are active, with most production for the home market. Exports of galvanized sheets are quiet, and the domestic demand is fair.

The Continent reports trade improving, with Russia an important buyer of steel plates. Berlin reports active conditions in home and export demand.

Metallurgical Coke

Coke Prices, Page 65

Standard furnace coke has firmed up about 10 cents a ton recently and is now quoted at $3.65 to $3.75 a ton, Connellsville, Pa., ovens, although foundry grades are slightly easier and are quoted at $4.25 to $4.40, which is off 10 cents a ton. Premium foundry coke remains $5.50 to $5.75. The western Pennsylvania market has been aided by resumption of the Chateaugay, N. Y., furnace, which had been banked for several months. Source of supply for the Pittsburgh Steel Co.'s Monessen, Pa., blast furnace has recently been changed and Davison Coke & Iron Co. is supplying this coke from its Neville Island, Pa., plant. Notable stability in coke prices is contrary to a weak and widely erratic market on soft coal.

By-product foundry coke is being extended into December at unchanged prices by Chicago producers, with November shipments about 20 per cent above the preceding month. Birmingham, Ala., ovens find conditions improved following settlement of the coal strike. Prices are being held steady.

Cold Finished

Cold Finished Prices, Page 65

Pittsburgh—Numerous cold-finished steel bar consumers from virtually every district were pressing producers last week for some stand on the first-quarter market. The cold-finished steel bar industry, a large factor in which is the nonintegrated producer, was obliged to wait on the price announcement on hot-rolled bar producers. By mid-week, assurance was given that hot-rolled bar prices would remain unchanged, avoiding an advance in cold-drawn bars from the 1.95c, Pittsburgh, base.

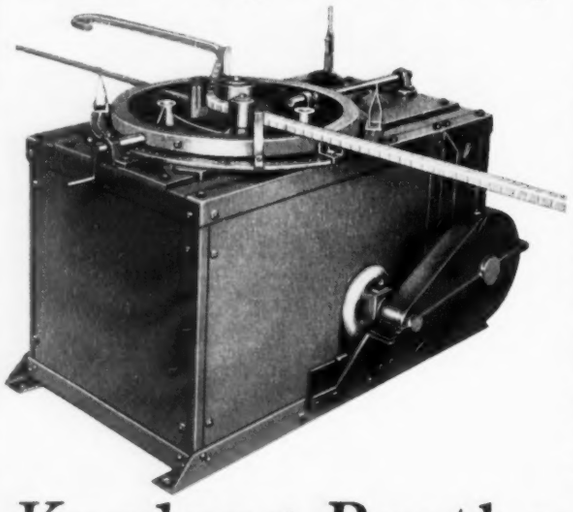
Nonferrous Metals

Nonferrous Metal Prices, Page 66

New York—Renewed demand for electrolytic copper featured domestic nonferrous metal markets last week. The market was stimulated by rumors of a likely price advance soon to 9.50c, Connecticut. Lead, zinc and tin held steady.

Copper—Independent consumers took the bulk of the metal sold although company-owned fabricators

Kardong Four-way Bender



Model D-2

The Model D-2 Kardong Four-way Bender was designed because of the popular demand for this type of Bender.
In the bending of large bars they do not have to be turned over to make the reverse second bends and in the 180 degree hook bars, after making the first hook the bending member is in position to make second hook by just switching resistance roller to opposite side.
The resistance roller plates are adjustable. The same construction is carried thru on this machine as in all of our benders and is guaranteed to give absolute satisfaction. Ask for catalogue of our complete line of reinforcing steel bar benders.

Kardong Brothers, Inc.

Minneapolis, Minn.

also participated in the buying. Fairly large orders were understood to have been placed for March delivery. All sales were made on the firm basis of 9.25c, Connecticut, for electrolytic.

Lead—Activity in the lead market was well sustained with total week's business making a favorable showing. Prices held firm at 4.35c, East St. Louis, and 4.50c, New York, with St. Joseph Lead obtaining $1 premium on the latter market.

Zinc—Prime western zinc sales were slow from day to day but the price tone was steady at 4.85c, East St. Louis. Shipments moved at a fair pace to consumers and were estimated at over 4000 tons for the week.

Tin—Straits tin sales were light, being limited to a considerable extent by tightness of spot and nearby supplies. Prices held fairly steady with closing levels on spot Straits around 51.25c.

Antimony — Spot Chinese antimony was still extremely scarce with prices nominally unchanged at 14.00c to 14.75c, duty paid New York. Sales of American metal were light with quotations unchanged at 13.75c, New York, on spot.

Quicksilver

New York—Quicksilver is unchanged and quiet with some sellers still talking higher prices. No test has yet been made.

Activities of Steel Users and Makers

THROUGH a stock purchase arrangement just completed, controlling interest of the Cleveland Welding Co. has been returned to substantially the same Cleveland hands that held control prior to the company's affiliation some five years ago with Motor Wheel Corp., Lansing, Mich., according to H. I. Kranz, president. The plant, located at West 117th street and Berea road, Cleveland, covers 21 acres and employs 500 persons. The company also maintains an office in the General Motors building, Detroit, under the management of Dave R. Jones.

♦ ♦ ♦

Willett Mfg. Co., manufacturer of road and street maintenance, has moved its office and business from Grand Rapids, Mich., to Plymouth, Ind.

♦ ♦ ♦

Allegheny Steel Co., Brackenridge, Pa., is now getting national distribution on a new low-price line of stainless metal knives, forks, spoons and other tableware, according to W. F. Detwiler, executive vice president. A patented process of differential rolling owned by the company is utilized in the manufacture of this tableware which, he declared, cannot be tarnished, scratched, bent, or dented in ordinary use. Allegheny reports an increase of 16 per cent in volume and 18 per cent in value of alloy steel sales in the first ten months of 1935 over the corersponding 1934 period.

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Struthers-Wells Co. has removed its New York office to the R.C.A. building, 30 Rockefeller Plaza, New York.

♦ ♦ ♦

Great Lakes Foundry Sand Co. is removing its general offices and laboratory to 720 United Artists building, 154 Bagley avenue, Detroit.

♦ ♦ ♦

The Carnegie, Pa., yard of the former Hausman & Wimmer Co. was sold at public auction in Pittsburgh, Nov. 18, to J. Copelan, Carnegie, Pa.

♦ ♦ ♦

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., continues to expand its operations in the gasoline business in order to provide a ready outlet for benzol, a by-product of its coke ovens. Three new stations, retailing "Sloss special benzol," have been opened in the last 30 days, making a total of 18 independent outlets in the city. In addition to these, the company operates a half dozen retail stations of its own at its plants and commissaries.

♦ ♦ ♦

Acme Steel Co., Chicago, is removing its New York office to 103 Park avenue, New York, effective Dec. 2. The warehouses wil be maintained at the old location in Bush terminal, Brooklyn, N. Y.

♦ ♦ ♦

Hickman, Williams & Co., Chicago, ferroalloys, pig iron, coal and coke, has established new offices at 30 East Forty-second street, New York, in charge of Norman E. Craig.

♦ ♦ ♦

Babcock & Wilcox Co., New York, to provide a closer contact between customer and plant, has transferred the refractories division sales office for the southeastern district from Atlanta to the works at Augusta, Ga.

♦ ♦ ♦

Kennedy Valve Mfg. Co., Elmira, N. Y., has appointed Frank De Witt & Co., Detroit, representative in the lower peninsula of Michigan, including Detroit, for the sale of iron body and bronze valves, malleable iron and

STAMPING LATITUDE » » » PLUS

TO permit a universal solicitation of *the difficult* in steel stampings necessitates an enormous productive range in presses. Parish masters this essential by maintaining a battery of presses producing parts under as little as 50 tons or as much as 4000 tons pressure and from plate as thin as 1/32 inch or as thick as 1/2 inch.

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Pacific Coast Rep.: F. Somers Peterson Co., 57 California St., San Francisco, Cal.

bronze screwed fittings, and cast iron flanged fittings and flanges for industrial plants, and commercial and residential buildings.

• • •

Timken Roller Bearing Co., Canton, O., has booked an order from the Pennsylvania railroad for Timken bearings and boxes for one of its high-speed passenger locomotives.

• • •

Bright Light Reflector Co., Brooklyn, N. Y., has purchased a 5 x 12-foot oil-fired porcelain enameling oven from the Ferro Enamel Corp., Cleveland, which will engineer and erect it.

• • •

Four-Way Lock Co., 4900 Lexington avenue, Cleveland, will remove its general offices and factory to 4619-25 Ravenwood avenue, Chicago, effective Nov. 29. An office will be maintained at 1814 East Fortieth street, Cleveland, and at 50 Church street, New York.

• • •

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., has appointed E. Arthur Tutein Inc. as its eastern sales agent, effective Dec. 1, with offices at 52 Vanderbilt avenue, New York. It has also appointed the United States Fuel & Iron Co., Oliver building, Pittsburgh, as sales representative in the Pittsburgh district, effective Dec. 1.

• • •

Stephen Briggs, who is chairman of the Briggs & Stratton Corp. and Outboard Motors Corp., Milwaukee, has purchased controlling interest of the Johnson Motor Co., Waukegan, Ill., maker of outboard motors, gasoline engines, refrigerator parts and other products.

Closes Sharon Sheet Mill

American Sheet & Tin Plate Co. has permanently closed its sheet mill at Sharon, Pa., and is removing some equipment to Gary, Ind.

J & L Barges 8000 Tons

Jones & Laughlin Steel Corp., Pittsburgh, sent out a tow of ten barges of steel products, which left Pittsburgh, Nov. 28, with about 8000 tons of steel for delivery to Memphis and other southern points.

A.F.A. Holds Apprentice Training Contest in 1936

Apprentice training committee of the American Foundrymen's association announces that it is to sponsor a contest for apprentices in iron molding, steel molding, and pattern making in connection with the 1936 convention of the A. F. A. to be held in Detroit the week of May 4.

Plans call for preliminary contests to be held by individual foundries or local trade or foundry associations, with the winning castings and patterns from these local competitions being forwarded to Detroit. At Detroit a committee of judges will select first, second, and third place winners in each of the three groups awarding prizes which will be given by the association.

The committee is issuing standard score cards for the use of the judges of the local and national contests. These provide for grading the casting entries on the basis of general appearance, soundness, time of production, gating and risering, etc. Pattern entries are to be graded on accuracy, moldability, workmanship, and time of production.

Copies of regulations for local contests may be secured by addressing the chairman of the apprentice committee, American Foundrymen's association, 222 West Adams street, Chicago.

Carnegie Contract to McKee

Arthur G. McKee & Co., Cleveland, has been awarded the contract for the excavation and foundations for the 100-inch sheared plate mill which the Carnegie-Illinois Steel Corp. will construct at its Homestead works, Munhall, Pa.

The new continuous hot strip mill being built by Carnegie-Illinois at its McDonald, O., plant near Youngstown, is expected to begin operations this week.

Form 4 New AFA Chapters

Four new chapters of the American Foundrymen's association, Chicago, have been organized recently in St. Louis, Detroit, Milwaukee, and San Francisco. The first two are former local associations. This makes a total of eight chapters, the others being in Chicago, the Quad Cities, Philadelphia and Cleveland.

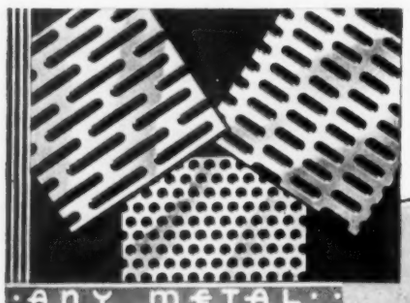
T. C. Hamlin, United States Radiator Corp., is chairman of the St. Louis chapter; Vaughan Reid, City Pattern Works, is chairman of the Detroit chapter, and W. F. Bornfleth, Foundry division, Cutler-Hammer Inc., is chairman of the Milwaukee chapter.

Technical Leaders To Address Carnegie Students

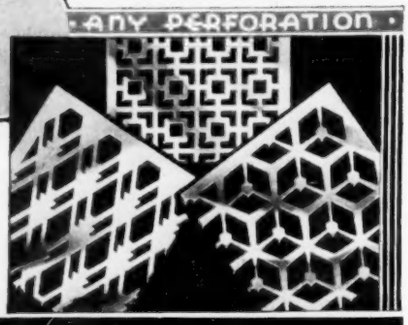
Students in the department of metallurgy at Carnegie Institute of Technology, Pittsburgh, are being given the opportunity this year of hearing a series of talks by a group of scientists prominent in the field of metals.

Lectures are given weekly and are part of a regular college course in modern metallurgical practice. The speakers who are co-operating with Carnegie in this unusual course, and their topics, follow:

E. H. Dix, chief metallurgist, Aluminum Research laboratories: "Struc-



INDUSTRIAL AND ORNAMENTAL SCREENS



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tural Aluminum Alloys"; J.P. Gill, chief metallurgist, Vanadium-Alloys Steel Co.: "Tool and Die Steels"; V. V. Kendall, research metallurgist, National Tube Co.: "The Engineering Problem of Corrosion"; R. R. LaPelle, industrial heating section engineer, power engineering department, Westinghouse Electric & Mfg. Co.: "Industrial Heating Furnace Problems"; P. G. McVetty, research engineer, Westinghouse Research laboratories: "Creep and Its Engineering Importance"; W. H. Phillips, vice president, Molybdenum Corp of America: "Molybdenum, Tungsten and Their Uses in Metallurgical Industry"; Richard Rimbach, consulting editor *Metals and Alloys:* "Metallurgical Literature"; Howard Scott, research engineer, Westinghouse Research laboratories: "Metals and Alloys in the Electrical Industries"; Jerome Strauss, who is vice president, Vanadium Corp. of America: "The Use of Vanadium in the Steel Industry"; R. L. Templin, chief engineer of tests, Aluminum Research laboratories: "Forming, Testing and Design Problems"; and T. D. Yensen, manager, magnetic division, Westinghouse Research laboratories: "Important Modern Magnetic Alloys and Their Uses."

Foreign Trade

FROM reports by consuls and commercial attaches to the department of commerce, Washington, STEEL culls the following interesting world developments in the iron, steel, metalworking and equipment industries.

CANADA LIKES U. S. MACHINERY

American manufacturers of industrial machinery greatly improved their position in the Canadian market. In the first half of 1935 they shipped in $10,827,020 worth of machinery, exclusive of agricultural, office and household machinery, an increase of 11 per cent over the corresponding period of 1934. Much of this total was for automobile plants. Demand for textile and leather machinery was lighter.

SPAIN ALSO MACHINERY BUYER

Spain also is taking a preference to American industrial machinery, and of its total imports in the first seven months of 1935 American manufacturers supplied 15.6 per cent, against 12 per cent in 1934, and 6.7 per cent in 1932. German and British tools have lost some favor in Spain, while France has improved its standing. Receipts from the United States in the first seven months of 1935 were valued at $66,560.

CANADA TO MAKE TIN PLATE

American exports of tin plate to Canada, which constituted the bulk of the $7,110,024 imported in the year ended March 31, 1935, may suffer from the prospect that the Algoma Steel Corp. Ltd., Sault Ste. Marie, Ont., will begin the production of tin plate within the next year or two. Extensions to the present Algoma plant will be sufficient to make it self-contained in everything but the tin itself.

JAPAN SPEEDS PRODUCTION

Japan has appreciably increased its production of iron and steel this year. For the first seven months of 1935 output of pig iron was 1,571,242 metric tons, or 15 per cent over the 1,365,708 tons a year ago. Output of "ordinary carbon steel" in seven months was 2,615,752 tons, against 2,115,823 tons a year ago. Production of what is called "steel products" amounted to 2,062,609 tons, compared with 1,744,144 tons in the like period of 1934. These totals include the newly-opened steelworks in Manchuria—beg pardon, Manchukuo.

New Deal Jousts with Steel

(*Concluded from Page* 16)

week with an issue that was barbed, but found an "out." The British freighter FARNHAM, after loading 5000 tons of scrap at Boston for Genoa, stopped at Sydney, N. S., for 450 tons of of bunker coal. There was some speculation whether the cargo might be detained. But Canada ruled that while it prohibits shipments of scrap to Italy, such material might pass through Canadian ports from nonsanctionist countries.

When President Roosevelt was promising an investigation of alleged collusion of domestic steelmakers—which is now materializing—he also declared his intention of initiating an investigation to determine whether German steel was being dumped in the United States. However, up to the end of last week no dumping investigation had been ordered.

Mr. Ickes last week issued the formal order revising the differential on domestic materials on nonfederal projects. Where the foreign bid is $100 or less a differential of 100 per cent will apply; where the foreign bid exceeds $100, the differential will be 25 per cent. Heretofore it has been 15.

Men of Industry

(*Continued from Page* 26)

which are serving in such severely stressed units as the engine beds of the high-speed streamlined trains, and crankcases of high-speed diesel engines, as well as many other welded steel structures for machinery and equipment.

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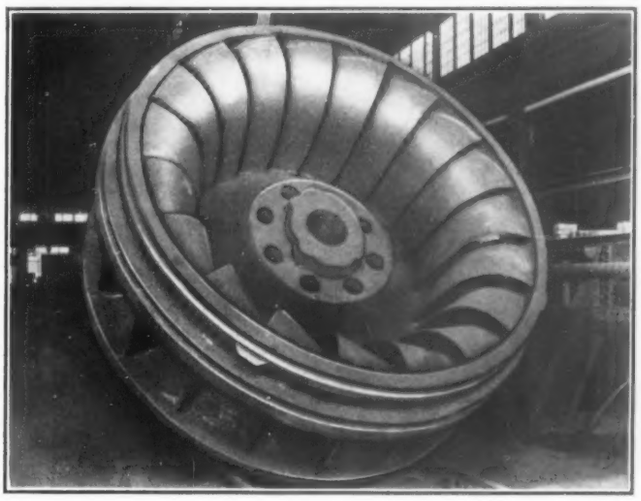
Rudolph Heidrich, formerly with Frederick Coleman & Sons, Detroit, has been added to the executive per-

"STANDARD" CASTINGS



45,000 lb. Runner Casting for Hydro-Electric Plant

Rolled Steel Wheels—Rolled Steel Rings and Flanges
Forgings—Steel Castings—Steel Tires
Springs—Gear Blanks

STANDARD STEEL WORKS COMPANY

BURNHAM, MIFFLIN CO., PENNA.

District Offices

New York | Philadelphia | Portland, O. | Chicago | St. Louis | San Francisco

sonnel of the Mullins Mfg. Co., Salem, O., as chief engineer.

♦ ♦ ♦

Harry T. Porter, 2436 Reading road, Cincinnati, has been appointed representative in Cincinnati and vicinity by the American District Steam Co., North Tonawanda, N. Y., manufacturer of steam distribution equipment.

♦ ♦ ♦

Benjamin F. Fairless, president, Carnegie-Illinois Steel Corp., Pittsburgh, was honored by Pittsburgh district alumni of his alma mater, Ohio Northern university, at an informal dinner in the Fort Pitt hotel, Pittsburgh, Nov. 26.

♦ ♦ ♦

John R. Hertzler has been named manager of the air conditioning division of the York Ice Machinery Corp., York, Pa. Prior to his appointment, Mr. Hertzler was manager of the air conditioning division of the New York branch of the company.

♦ ♦ ♦

Gerald Hullet has been named vice president in charge of sales of Electromaster Inc., Detroit, following a meeting of the company's board of directors recently. Other personnel changes include Henry H. Hubbard, as vice president in charge of manufacturing, and Earle R. Genthe as secretary-treasurer.

♦ ♦ ♦

W. C. Stevens, chief engineer, and G. S. Crane, sales manager, Cutler-Hammer Inc., Milwaukee, have been elected vice presidents, in recognition of their services. They will continue as heads of the two departments. Both have been with the company more than 25 years. For some time, Mr. Crane served as manager of the Cleveland office.

♦ ♦ ♦

O. R. Wikander, mechanical engineer, Edgewater Steel Co., Pittsburgh, has been awarded the Melville medal for 1935 by the American Society of Mechanical engineers for his paper "Draft Gear Action in Long Trains." The paper covers investigations sponsored by the Edgewater company.

This medal, endowed by Rear Admiral George W. Melville, past president of the society, is awarded when a paper of exceptional merit is presented to the society.

♦ ♦ ♦

Harold S. Austin recently was appointed foundry metallurgist and general foreman of cupolas of the Buick Motor Co., Flint, Mich. He was graduated from Rose Polytechnic institute in 1907 with a bachelor of science degree, and later obtained an advanced degree in chemical engineering.

Mr. Austin's early experience and training were obtained with the Laclede Gas Co., Peoples Gas Light & Coke Co., Underwriters' Laboratories, American Steel Foundries, Hubbard Steel Foundry Co., and Lackawanna Steel Co. For the past 17 years he has been connected with the Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich. as chief chemist and metallurgist.

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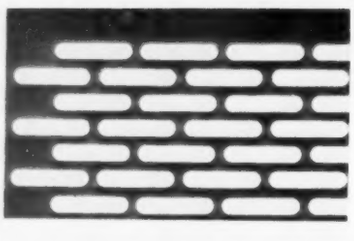
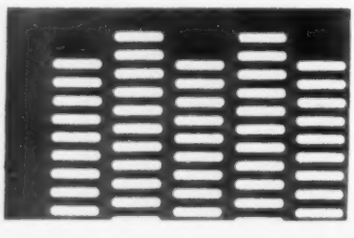
Scott Mackay, formerly associate professor of metallurgy, University of Wisconsin, has been made professor of ferrous metallurgy, Rensselaer Polytechnic institute, Troy, N. Y. Upon graduation from this institute, in 1913, he spent some months in the blast furnace and steel mill plant at Ensley, Ala., and then joined the Anniston Steel Co., becoming engineering assistant to the manager. Shortly after the outbreak of the war he became connected with British Forgings Ltd., Toronto, Ont., as a senior melter, and remained in that position until 1919, when he joined the Jones & Laughlin Steel Corp. Later he was made general superintendent of the Stowell Co., Milwaukee, and in 1925 was named production manager of the Globe-Union Mfg. Co. He went with the University of Wisconsin in 1927.





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Equipment

Chicago — Equipment and machinery business is fairly steady, aided by a moderate pickup in machine tool orders. Tool sales in the immediate Chicago district have shown little change but are more active in other sections. The city has closed on a number of machine tools for the Cermak pumping station, including a lathe, shaper, drill press, machine saw and grinder. Small tool buying is holding to its recent active rate. Foundry equipment demand is in steady or improved volume.

Pittsburgh — Arthur G. McKee & Co., Cleveland, has been awarded the contract for excavation, foundation construction and sewer construction for the new 100-inch shear plate mill at Homestead, Pa., of Carnegie-Illinois Steel Corp. In construction of the excavation, about 88,000 cubic yards will be removed and about 47,000 cubic yards of concrete will be required for foundations, involving in all about 400 tons of reinforcing materials. Construction of the sewers will require about 6000 lineal feet. Carnegie-Illinois has approved an appropriation for the Clairton by-product coke plant, enabling increased facilities for recovering and refining phenol and its homologues from by-product coke plant ammonia liquor. This appropriation will increase the Clairton phenol production and refining capacity by about 50 per cent.

Boston — Machinery orders are well sustained and are diversified, with deliveries becoming more extended. Some business is being closed with railroads, out of the market for several years. Machine tool manufacturers not only are experiencing a shortage of skilled mechanics, but also a delay in delivery of special castings and steel.

Seattle — Interest is focused on pumping equipment required for numerous municipal water system improvements in this area. Mining is suffering the usual seasonal decline while the lumber industry is hesitant because of uncertainty over the new trade treaty with Canada.

Construction and Enterprise

Michigan

DETROIT—Bids on the four incinerator plants to be erected for this city are due Dec. 4.

DETROIT.—Shatterproof Glass Co., 151 South Waterman avenue, is contemplating the construction of its factory recently damaged by fire. Cost is estimated at $40,000.

DETROIT—Preliminary plans for the construction of a two-story $250,000 union bus terminal building at Washington boulevard and Grand River avenue, have been prepared. Construction will start after Jan. 1, 1936, pending approval of the Detroit common council. Manferd Burleigh is president of the Greyhound Terminal of Detroit Inc. and vice president and general manager of Greyhound Lines.

DETROIT—Giffels & Vallet Inc. are preparing plans for additions to the electrical building at the Ford Motor Co.'s power plant, Dearborn, Mich. Plans are also being made for a pipe bridge and tunnel at the plant of the Murray Corp. of America, Detroit, and for an addition and alterations to the plant of the Michigan Electrotype & Stereotype Co., Detroit. L. Rossetti is associated Detroit engineer and architect.

DETROIT—Arthur G. Sherman, president, Covered Wagon Co., has announced plans for the removal of his company to Mt. Clemens, Mich., having completed negotiations for the acquisition of the National Candy Co. plant on Cass avenue. Mr. Sherman expects to begin manufacturing the house-type trailer within the next few weeks, and have operations in full swing by Dec. 15. In addition to the purchase of the plant, Mr. Sherman is acquiring a ten-acre tract adjacent to the Mt. Clemens plant, to be used for the construction of a model camp, and for the future expansion of its manufacturing facilities.

EAST LANSING, MICH.—Lakeland Refinery Co, is having plans prepared by the Miller Engineering Service, Chicago, for an oil refinery and a distillate plant, costing approximately $100,000.

FLAT ROCK, MICH. — Michigan Silica Co. plans construction of a silica sand refinery, including concrete and steel storage bins and buildings, screening plant, dryers, conveyors and crusher plant. Smith, Hinchman & Grylls, Marquette building, Detroit, is engineer. Estimated cost is $100,000.

MONROE, MICH. — City council awarded a $243,325 contract for the construction of a flood control pumping station and sewage disposal plant to the Martin & Krausmann Co., Detroit, subject to the approval of PWA, which is helping to finance the project.

THREE OAKS, MICH. — Elmer Kaiser, manager of Three Oaks Co-op. Inc., has announced that the association has leased the large roller mills formerly owned by the late L. G. Miner, on the east side of the business section, and will move there soon. Wade Martin is the office assistant, and the general manager of the business is A. George, of Buchanan, Mich.

Illinois

BARRINGTON, ILL.—City is planning for sewers and a treatment plant. A PWA project. Consoer, Townsend & Quinlan, 220 West Wacker drive, Chicago, is engineer.

BATAVIA, ILL.—Plans for the construction of a $600,000 manufacturing plant here have been announced by Ernest M. Oswalt, president of the Campana Corp., manufacturer of toilet goods.

CHICAGO—Ingersoll Steel & Disc Co., 1000 West 120th street, is making plans through T. W. Hughes for a 27 x 80 foot and 50 x 65 foot addition to plant.

CHICAGO—Young Spring & Wire Corp., 1605 Holbrook street, Detroit, has completed the construction of its second branch plant, to be located in the Clearing industrial district, Chicago.

CHICAGO—Sisko Mfg. Co., 4642 Ravenswood avenue, has been incorporated by T. J. Harrigan Jr., Alex Deschebeko, and Otto Isensee Jr., to do a general manufacturing business. Correspondent is R. E. Ogden, 1016 Madison street, Oak Park, Ill.

CHICAGO—Magnetic Ray Sales Corp., 3264 West Grand avenue, has been incorporated by Fred W. Gehrer, Howard G. Warwick, and Arthur E. Bond, for the manufacture of metal specialties and electrical devices. Correspondent is Rupert C. Spohr, 222 West Adams street.

DECATUR, ILL.—Model Brass Co. Inc., 232-240 East Decatur street, has been incorporated by Harley O. Potter, Ted Fleming, and Clifford V. McKelvey, for the manufacture and sale of brass, aluminum and bronze castings, etc. Correspondent is E. E. Horton, 1407 Peoria Life building, Peoria, Ill.

GALVA, ILL.—Galva Farm Machinery Co. has been incorporated by Sheldon Peck, William N. Smith, and A. A. Furman, for the manufacture of cotton harvesting, extracting, picking, and cleaning machinery. Correspondent is Sol Andrews, 188 West Randolph street, Chicago.

Ohio

CARTHAGE, O.—The interior of the Valley Radiator Co.'s plant at 7214 Vine street was damaged recently by fire.

CLEVELAND—The American Monorail Co., 13107 Athens avenue, manufacturer of overhead conveying equipment, is expanding its plant by an additional 3000 square feet, in its present location. No additional machinery is contemplated.

CLEVELAND—Case School of Applied Science, Euclid avenue and Wade Park, is contemplating the construction of a three-story chemical laboratory and electric building. W. E. Wickenden is president. Estimated cost is $2,500,000.

FRAZEYSBURG, O.—Municipality is making plans for a waterworks system, to cost $70,000. Rosch & Hartline, New Philadelphia, O., is engineer.

MINERAL RIDGE, O.—Land and buildings, machinery and equipment, finished materials and accounts receivable of the Standard Wire & Tube Co. will be sold at public auction on Dec. 5, by Industrial Plants Corp., Columbus, O. Standard Wire & Tube Co. were manufacturers of pipe fittings, conduit,

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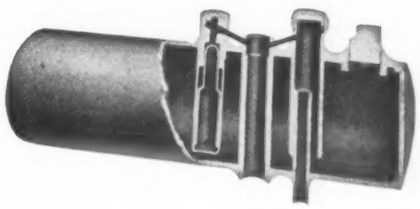

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TOLEDO, O.—Champion Spark Plug Co. of this city is now planning to establish factories in England and France.

WELLSVILLE, O.—This city will have a new industrial plant in the near future as a result of a meeting of merchants and business men, with officers of a company which plans to engage in the manufacture of rivets, bolts and nuts.

YOUNGSTOWN, O.—Roofing & Sheet Metal Inc., Mahoning avenue and Hogue street, is having a new steel building erected by the Scholl-Choffin Co. The latter company recently purchased the Dalzell Co. here.

Indiana

ANDERSON, IND.—Articles of incorporation have been filed with the secretary of state by the Lavelle Grey Iron Foundry Corp., 1428 Chase street, in this city. The company has been formed to do a general foundry business and the incorporators are Thomas F. Lavelle, also named resident agent, Bernard J. Lavelle, and Bernard J. Lavelle Jr.

COLUMBUS, IND.—Noblitt Sparks Industries Inc., maker of automobile accessories, has purchased the Lincoln chair factory building in this city, from W. H. Lincoln. The property will be used by the company for general office and assembly purposes.

Connecticut

STAMFORD, CONN.—American Cyanamid Corp., 30 Rockefeller Plaza, New York, has acquired the plant formerly occupied by H. E. Verran Co., Post road. It is a 12-acre site and the corporation plans to recondition it for its own use.

Massachusetts

DEERFIELD, MASS.—Plans of the town board of selectmen, town hall, are nearly complete for the construction of about 9 miles of 8-12-inch cast iron sewers, costing $198,100. PWA has made a grant of $89,100. H. M. Turner, 12 Pearl street, Boston, is engineer.

RANDOLPH & HOLBROOK, MASS.—Town joint water board, J. McNeil chairman, town hall, Randolph, plans a water filtration plant, costing $65,000. Have PWA grant of $29,250. F. O. Stevens, town hall, Randolph, is engineer.

Maine

WATERVILLE, ME.—Lockwood Mfg. Co., at its annual meeting last July, voted to expend $250,000 for new machinery, and this program is now being carried out, much new equipment having been purchased.

New Hampshire

BELMONT, N. H.—Town board of selectmen, town hall, is making plans for a waterworks system, with pipe line, etc., costing $36,000. It is a PWA project. H. M. Bryant, Milton, is engineer.

MILTON, N. H.—Town board of selectmen, town hall, is making plans for additions to waterworks system, consisting mainly of additional pipe lines, costing $65,000. PWA project. H. M. Bryant, Milton, is engineer.

New York

BOLIVAR, N. Y.—O. D. Underwood and C. J. Swan, 818 West Sullivan street, Olean, N. Y., are planning on the installation of a pressure plant to force recovery of crude oil from 120-acre property along Bolivar-Allentown highway, to cost $17,750 or more. Project includes pumping machinery, air compressors and equipment. Maturity at once.

BUFFALO — United States coast guard, Washington, has plans nearing completion and soon takes bids for bulkhead with sheet steel piling, costing $50,000. R. D. Gault, 452 Wilkins building, Washington, is engineer.

BUFFALO — Keith Williams, vice-president and general manager of Pratt & Letchworth Co., Tonawanda street, has announced that the company's malleable iron foundry department has been moved to Dayton, O. The Dayton Malleable Iron Co., parent company of the Pratt & Letchworth Co., will perform the work formerly done in Buffalo.

NEW YORK—Superior Die Cutting Co. is approximately trebling its space occupancy at 59 Morton street, having leased two additional floors comprising 40,000 square feet.

NEW YORK—Henry Motors Inc., Brooklyn, N. Y., has been incorporated to deal in motors, engines, and machines, by Furst, Schwartz, Schwager & Landau, 130 Clinton street, Brooklyn, N. Y.

NEW YORK—White Co., 31-10 Thompson avenue, Long Island City, N. Y., plans purchasing a factory building and will alter and equip same for branch plant, shop and service. Cost will exceed $10,000.

NEW YORK—Plans are being made by Lama & Proskauer, 383 Jay street, Brooklyn, N. Y., for J. Cafiero, 2113 Neptune avenue, Brooklyn, for the altering of a bulk fuel oil storage tank. Estimated cost is $28,000.

NEW YORK—Allen-Ingraham Inc. has been incorporated to deal in electrical machinery by Ethel V. Snyder, 6323 Prospect avenue, Ridgewood Heights, Queens, N. Y., William B. Stitt, 7 Putnam road, Scarsdale, N. Y., and Herbert A. Tight, 459 Halsey street, Brooklyn, N. Y.

NEW YORK—Articles of incorporation have been filed for Lee Ganz Scrap Iron and Metal Co., Kings, N. Y., dealers in metal, by Lee Ganz, 882 Linden boulevard, Brooklyn, N. Y., Henry J. Greenstein, 886 Linden boulevard, Brooklyn, N. Y., and Beatrice Forman, 322 Chilton street, Elizabeth, N. J.

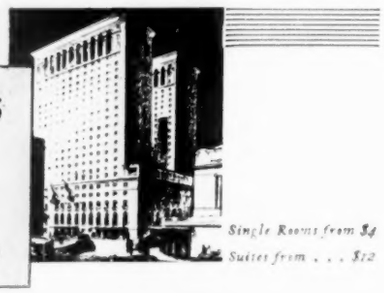
NEW YORK — Kalsom Machinery Corp., Manhattan, has been organized to deal in engines, boilers, machinery, tools, and hardware, by Harold S. Leslie, 255 Ocean avenue, Brooklyn, N. Y.; Marjorie M. Julig, 104-64 115th street, New York, and Morris E. Goldman, 772 Hopkinson avenue, Brooklyn.

ROCHESTER, N. Y.—Rochester Gas & Electric Corp., 89 East avenue, is making plans for a steam turbine generating plant near station 3, costing $1,000,000. E. M. Gilbert, 512 Washington street, Reading, Pa., is engineer.

TONAWANDA, N. Y.—Plans are being made for a new aircraft manufacturing company, to locate either here or in Pittsburgh, including the erection of three buildings for the manufacture of low-priced planes. G. McLean Gardener, former vice president of the General Aeroplane Corp., Abbott road, Buffalo, is said to be one of the men interested in the new organization.

TROY, N. Y.—Consolidated Products Co., 2008 Park Row building, New York, has purchased the completely equipped gum plant of the Amalgamated Gum Co. and immediate liquidation of all machinery and equipment is planned. Prospective buyers of equipment can see machinery set up just as it was used.

YONKERS, N. Y.—Spreckels Sugar plant has been purchased by A. M. Kahn, president of Consolidated Products Co., 2008 Park Row building, New York, and Edgar H. Stone, former vice president of Spreckels Corp. Plans of the new owners are to dispose of the property as a going concern. The plant,



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New Jersey

GLOUCESTER CITY, N. J.—City has PWA approval of waterworks project costing $50,000. Andrews & Giesele, 916 Middlesex street, is engineer.

NORTH BERGEN, N. J.—Warren Dyke works has been liquidated by Consolidated Products Co., 2008 Park Row building, New York, and equipment is being disposed of.

PATERSON, N. J.—Lyons Piece Dye works has been liquidated by Consolidated Products Co., 2008 Park Row building, New York, and modern machinery and equipment is being disposed of.

TRENTON, N. J.—P. Morton, manager, and city council, plan to replace mains with 30-inch line from Calhoun street to Broad and Lafayette streets, at a cost of $67,000. Plan also to replace 4-inch mains with 8-inch mains over five miles of city streets, at a cost of $117,500. Have PWA loan. A. G. Gregory, city hall, is engineer.

Pennsylvania

PHILADELPHIA — Frankford Arsenal asks bids Dec. 5 for steel base plug forgings and steel adapter forgings.

PHILADELPHIA—The Philadelphia Spring Works Inc., operating a chain of automobile spring manufacturing and service plants, has purchased property at 1316-20 Poplar street, and after extensive alterations will occupy it as its Philadelphia headquarters.

Missouri

MARSHALL, MO.—City will issue bonds and obtain federal funds for the improvement of its power plant. Cost will be $150,000 and the consulting engineer is Henrici-Lowry Engineering Co., West Tenth street building.

MEXICO, MO.—Mexico Refractories Co., manufacturer of fire brick and refractory shapes, fire clay, etc., has begun expansion and improvements at its plant. A new tunnel kiln unit will be built, with installation of additional equipment in other departments and plant modernization as required. Cost will be over $50,000 with equipment.

RICHMOND HEIGHTS, MO.—City, B. W. LaTourette mayor, votes Dec. 9 on $135,000 sewer bonds. Leif J. Sverdrup, Railway Exchange building, Clayton, Mo., is city engineer.

ST. LOUIS—Mississippi Valley Equipment Co., 511 Locust street, St. Louis, wants prices and data on a generator, compressor, single roll crusher, and a boiler.

ST. LOUIS—Mississippi Valley Equipment Co., 511 Locust street, wants prices and data on diesel generator set, 3-phase, 60-cycle, 2300-volt, complete with equipment for use as main power supply; 240 or 360 horsepower Fairbanks-Morse engine, style VA, or other full diesel engine, 240 or 400 horsepower.

ST. LOUIS—Laclede Power & Light Co. is arranging finances for extensions and improvements early in 1936 to cost $3,500,000. For the new steam-electric generating plant $2,400,000 will be spent, while $300,000 will be expended for line extensions and betterments. Management & Engineering Corp., 321 South LaSalle street, Chicago, is engineer.

ST. LOUIS—Board of public service receives bids Dec. 13 for furnishing, coating, and delivery of 6-inch welded steel pipe for pressure conduit from Howard Bend pumping station, to Stacy Park reservoir, costing $620,000; and for furnishing materials, tools, and equipment necessary for distributing, laying, and testing a 60-inch welded steel pressure conduit, costing $26,000.

Arkansas

NEWPORT, ARK.—Folding Coop & Crate Co., 312 Front street, wants information from steel working plant pertaining to the manufacture of steel coop under patents, including folding coops, crates, and cases.

Oklahoma

IDABEL, OKLA.—National guard armory, housing two infantry units, was severely damaged by fire recently, including about $10,000 of government equipment.

OKLAHOMA CITY, OKLA.—The warehouse of the Oklahoma Sash & Door Co. was severely damaged by fire.

Texas

CENTER, TEX.—City, O. J. Rushing city secretary, receives bids Dec. 9 for constructing waterworks. Joe E. Ward, Wichita Falls, Tex., is city engineer.

HOUSTON, TEX.—Frank W. Bennett of the Bennett Refining Co., Esperson building, has acquired two oil refining plants, each having a 1000-barrel capacity crude oil daily, at Houston and Manchester on the Houston Ship Channel. In addition, purchase was also made of the shipping terminal and pipeline running between the two plants, and other equipment.

MOORE, TEX.—United Carbon Co., Union building, Charleston, W. Va., has under construction a carbon black plant at Borger, Tex., plans erecting plant at Moore.

ORANGE, TEX.—Equitable Paper Bag Co., 314 Scholes street, Brooklyn, N. Y., is planning the installation of motors and controls, conveyors and other equipment, in paper mill at Orange where company has acquired plant formerly owned by the Commercial Pulp & Paper Co. Project includes remodeling and improving, modernizing the power plant and adding new equipment. The new plant will bear the title of the Orange Paper & Pulp Co., and cost of improvements program will be $125,000. Frederick L. Smith, 21 East Fortieth street, New York, is consulting engineer.

RAYMONDVILLE, TEX.—City voted $125,000 bonds for constructing water and light plant.

Wisconsin

NEENAH, WIS.—Neenah Foundry Co. is erecting a foundry building and sand house. The structure was designed by R. E. De Long of Menasha, Wis., and the general contractor is the Neenah Building Co.

Minnesota

FERGUS FALLS, MINN.—City is voting on $160,000 bonds for the construction of a sewage disposal plant and sewerage system improvements. A PWA project. Pillsbury Engineering Co., 1200 Second avenue, south, Minneapolis, is engineer.

Nebraska

FULLERTON, NEBR.—The warehouse of Standard Oil Co. and three of its five gasoline storage tanks were damaged by fire.

Dominion of Canada

TORONTO, ONT.—National Cash Register Co. of Canada Ltd., Bloor street, West, subsidiary of National Cash Register Co., Dayton, O., is planning the installation of motors and conveyors, controls and other equipment in new local plant on Lansdowne avenue, at a cost of $300,000.

MONTREAL, QUE.—Precipitation Co. of Canada Ltd., A. K. Hugessen president, plans machinery manufacturing plant costing $50,000.

Foreign

LONDON, ENGLAND—E. A. S. Bell, 91 Petty France, Westminster, in behalf of the South Indian railroad, is in the market for pressed steel sleepers, broad and meter gage, and for metals, lead sheet, lead yarn, tin and zinc ingots.

Alabama

BIRMINGHAM, ALA.—Connors Steel Co. plans improvements to plant at Fifty street and Powell avenue, Woodlawn, Ala., including addition to machine shop, etc.

DECATUR, ALA. — Ingalls Iron Works, Birmingham, Ala., will construct a shipbuilding plant, preliminary work including survey to be under way soon.

FLORENCE, ALA.—Orlan B. Hill Jr. is special public works representative of chamber of commerce, for President Roosevelt's approved construction program in Alabama, involving 18 cold storage plants.

OPP, ALA.—WPA approved construction of $56,000 water works improvements, including the erection of a tank and tower, and the installation of a turbine and fire pump. Gray Henderson is district WPA director.

Louisiana

NEW ORLEANS—United States engineer, second district, Prytania street, asks bids Dec. 7 for steam towing engines.

Maryland

BALTIMORE—John McKenzie & Co., 405 East Centre street, steel manufacturer, has acquired warehouse and office on Key highway and Boyle street, and will erect additional units.

BALTIMORE — Columbia Specialty Co., Fayette and Caroline streets, has acquired a factory and adjoining site on Eastern avenue, and will make improvements.

FREDERICK, MD.—City will probably start work Dec. 20 on proposed sewerage system. Lloyd C. Fuller is mayor, and C. Maxwell is city engineer. Plans and specifications are being completed for western and southern sections.

District of Columbia

WASHINGTON—United States Engineer, 1068 Navy building, opens bids Jan. 8 for furnishing, installing, and testing motor driven pumping and elec-

(*Please turn to Page* 93)

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Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
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Norma Hoffmann Bearings Corp., Stamford, Conn.
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National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Timken Roller Bearing Co., The, Canton, O.

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Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
New Departure Mfg. Co., Bristol, Conn.
Timken Roller Bearing Co., Canton, O.

BEARINGS (Roller)
Bantam Ball Bearing Co., The, South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
Norma Hoffmann Bearings Corp., Stamford, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS (Roll Neck)
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Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
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Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Timken Roller Bearing Co., Canton, O.

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Timken Roller Bearing Co., Canton, O.

BEARINGS (Rolling Mill)
Bantam Ball Bearing Co., South Bend, Ind.
Cramp Brass & Iron Foundries Co., Paschall Sta., Philadelphia, Pa.
Hyatt Roller Bearing Co., P. O. Box 476, Newark, N. J.
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Midvale Co., The, Nicetown, Philadelphia, Pa.
Republic Steel Corp., Youngstown, O.
Standard Steel Works Co., Burnham, Pa.
The Stanley Works, New Britain, Conn. Bridgeport, Conn.
Timken Steel & Tube Co., Canton, O.

(Concluded from Page 91)

trical equipment in McMillan pumping station, Washington aqueduct.

WASHINGTON—Navy department, procurement division, public works branch, asks bids for copper bars, rods and strips Dec. 3, schedule 6534; marine boiler steel plates, Dec. 6, schedule 6539; electric arc welding sets, Dec. 6, schedule 6545, with delivery to be to Brooklyn and Newport; motor drive and pulleys Dec. 6, schedule 6548, delivery to Philadelphia; sheet steel Dec. 10, schedule 6555.

Kentucky

ELKRON, KY.—J. A. Barry Distillery Co. plans construction of an extension to its distillery here, to cost, with equipment, $45,000.

LOUISVILLE, KY.—Falls City Brewing Co. plans erecting an addition to bottling plant to give additional space of 200 x 300 feet. Ben H. Schrader, 314 Shawnee terrace, is president. Company also has under construction an addition to hops cold storage warehouse.

TAYLORSVILLE, KY.—City, W. R. Reasor mayor, receives bids Dec. 3 for constructing water works. C. N. Harrub Engineering Co., 711 American National Bank building, Nashville, Tenn., is engineer. Project calls for pumping machinery furnishing f.o.b. Taylorsville, four pumps and motors, and furnishing and erecting 50,000-gallon steel tank and tower.

Mississippi

COLUMBIA, MISS.—City, H. C. Rawls mayor, has PWA allocation of $32,169 for sanitary sewer extension.

GREENVILLE, MISS. — Pressroom and engine room of International Vegetable Oil Co. was damaged by fire. S. S. Cromer is local manager.

Florida

ST. AUGUSTINE, FLA.—City, Walter B. Fraser mayor, plans improvements to waterworks with PWA grant of $170,000. Bids will be called for before Dec. 15.

TAMPA, FLA.—Warehouse of Economy Cash & Carry Wholesale Grocery Co., Caesar street and Cumberland avenue, was severely damaged by fire.

Georgia

ATLANTA, GA.—City's $6,000,000 sewerage and drainage program will be divided between PWA and WPA. It is expected that sewer construction will get under way soon. Earle Cocke, Atlanta, is state director of national emergency council in Georgia.

North Carolina

CANTON, N. C.—T. E. King, Academy street and Penn avenue, machinery broker, wants prices and data on the following items. Six diesel crude oil engines with horsepower varying from 25 to 150, with delivery to Orangeburg, N. C.; one side crank steam engine, of type similar to Atlas, with delivery to Miley, S. C.; two tanks, one 1000 and one 2000-gallon capacity, suitable for gasoline storage, with delivery to Savannah, Ga.; truck tank, oval shape, 2000-gallon capacity, with delivery to Savannah, Ga.; one crank steam engine, automatic type, horizontal right hand side crank, 25 horsepower, with delivery to Canton, N. C.

FOUNTAIN, N. C.—Town receives bids Dec. 4 for constructing waterworks and sewer system, including a 50,000-gallon elevated tank or alternate 75,000-gallon elevated tank. Paul M. Van Camp, Southern Pines, N. C., is consulting engineer.

RALEIGH, N. C.—Certificates of incorporation have been filed in the office of Secretary of State Stacey W. Wade for Hutchens & Merritt Inc. of Mount Airy, for the manufacture of products from iron, steel, lumber, brass, and other materials. Partial capitalization has been handled by Leander Z. Hutchens, Mrs. Leona D. Hitchens, Oscar K. Merritt, and Mrs. Katherine R. Merritt, all of Mount Airy, N. C.

WINSTON-SALEM, N. C.—Henry Miller Steel Co. has been incorporated, with a capital of $50,000 by Henry A. Miller, 630 Irving street, and O. D. Bell.

South Carolina

FINGERVILLE, S. C. — Franklin Process Spinning Mill Inc. is installing new equipment, including modern long draft spinning equipment.

FORT MOULTRIE, S. C.—Quartermaster asks bids Dec. 6 for wire screen cloth, nails, screws, galvanized pipe, guttering, and metal roofing.

Tennessee

MEMPHIS, TENN.—Young & Maury, general contractors, 166 Monroe street, want one 14s mixer and a small gas hoist.

SMITHFIELD, TENN.—City plans $45,000 water works. J. B. McCrary Engineering Corp., Atlanta, Ga., is engineer.

West Virginia

BEACH BOTTOM, W. VA.—Wheeling Steel Corp., Wheeling, W. Va., will build a pumping station and place two 12-inch suction pipes on the left bank of the Ohio river at Beach Bottom.

RANSOM, W. VA.—Town has applied to public service commission of Charleston, W. Va., for permission to construct a waterworks plant. Bonds will be issued.

WHEELING, W. VA.—Ackerman Mfg. Co., stop 22, River road, Warwood, W. Va., manufacturer of pressed steel products, plans erecting addition.

WILLIAMSON, W. VA.—City, O. E. Hogan mayor, receives bids Dec. 5 for constructing 40-ton capacity incinerator plant, costing $28,000. Meanor & Handloser are architects, Charleston, W. Va.

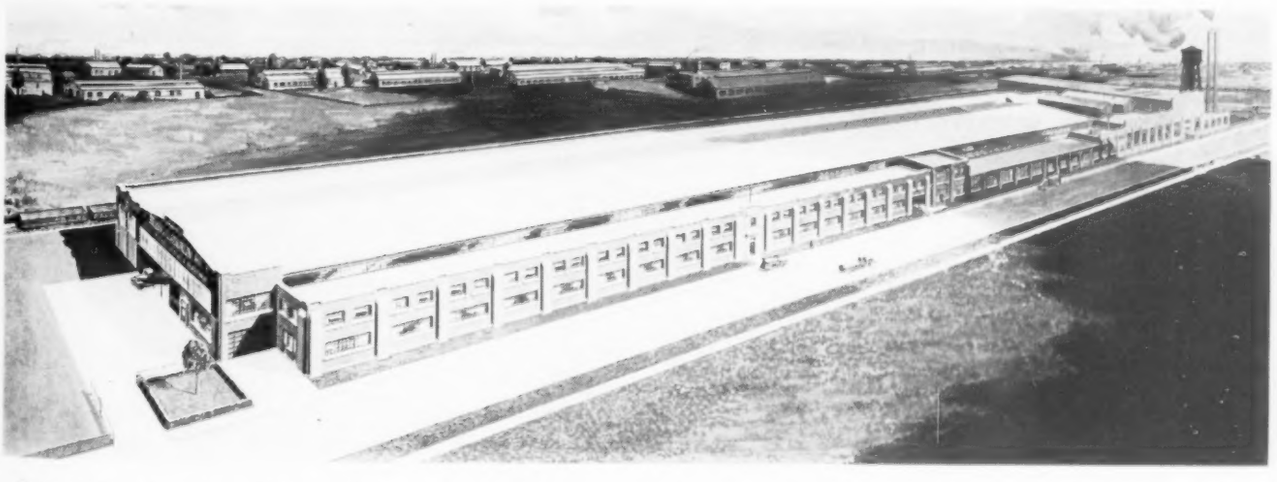
Virginia

HOPEWELL, VA.—Allied Chemical & Dye Corp. is constructing a plant here for the production of chlorine and nitrate of soda. Costing $1,000,000, the plant will be ready the first half of next year.

Pacific Coast

EVERETT, WASH.—Sandview Pulp Co. is planning for the construction of an addition to its pulp mill costing $75,000.

Western Mill of Bliss & Laughlin Inc., at Harvey, Ill., as Enlarged



Bliss & Laughlin Inc., Harvey, Ill., manufacturer of cold-finished steel and shafting, recently completed an expansion program at Harvey increasing the ground area 25 per cent. The manufacturing bays were extended, and the stock storage and shipping departments enlarged. Trucks can now be loaded more expeditiously.

WHERE-TO-BUY

WHERE-TO-BUY

BILLETS AND BLOOMS
(**Also Stainless*)
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie Steel Co., 327 Carnegie Bldg., Pittsburgh, Pa.
Illinois Steel Co., 208 S. LaSalle St., Chicago, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Ludlum Steel Co., Watervliet, N. Y.
*Republic Steel Corp., Youngstown, O.
Standard Steel Works Co., Burnham, Pa.
The Stanley Works, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown Marx Bldg., Birmingham, Ala.
Timken Steel & Tube Co., Canton, O.
Youngstown Sheet & Tube Co., Youngstown, O.

BLAST FURNACE SPECIALTIES
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)
Ford Chain & Block Co., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

BLOWERS
Coppus Engineering Co., 359 Park Ave., Worcester, Mass.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., Phillipsburg, N. J.
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.

BLUE PRINTING EQUIPMENT AND SUPPLIES
Bruning, Chas., Co., Inc., 445 Plymouth Ave., Chicago, Ill.

BOILER HEADS
Bethlehem Steel Co., Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS
Murray Iron Works Co., Burlington, Iowa.

BOLT AND NUT MACHINERY
Landis Machine Co., Waynesboro, Pa.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

BOLTS
(**Also Stainless*)
Bethlehem Steel Co., Bethlehem, Pa.
Illinois Steel Co., 208 S. La Salle St., Chicago, Ill.
Jones & Laughlin Steel Co., Jones & Laughlin Bldg., Pittsburgh, Pa.
Oliver Iron & Steel Corp., S. 10th & Muriel Sts., Pittsburgh, Pa.
*Republic Steel Corp., Upson Nut Div., 1912 Scranton Rd., Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

BORING MACHINES (Horizontal)
Landis Tool Co., Waynesboro, Pa.

BOSH PLATES (Copper)
Lawrenceville Bronze Co., Bessemer Bldg., Pittsburgh, Pa.

BOXES (Annealing)
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BOXES (Case Hardening)
Driver-Harris Co., Harrison, N. J.
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland, O.

BOXES (Open Hearth Charging)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BRAKES (Electric)
Clark, The, Controller Co., 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.

BRAKES (Press)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.

BRICK—(Insulating)—See INSULATING BRICK

BRICK (Refractory)—See REFRACTORIES, CEMENT, etc.

BRICK (Silicon Carbide)
Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

BRIDGE CRANES (Ore and Coal Handling)
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BRIDGES, BUILDINGS, VIADUCTS, STACKS
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd and Washington Ave., Philadelphia, Pa.
McClintic-Marshall Corp., Bethlehem, Pa.
Ohio Structural Steel Co., The, Newton Falls, O.
Truscon Steel Co., Youngstown, O.

BUCKETS (Clam Shell, Dragline, Grab, Single Line)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

BUILDINGS (Steel)—See BRIDGES, ETC.

BURNERS (Acetylene)—See TORCHES AND BURNERS

BURNERS (Automatic)
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Surface Combustion Co., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BURNERS (Fuel, Oil, Gas, Combination)
Surface Combustion Co., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

BUSHINGS (Bronze)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Gifford Engine Co., Eaton Rapids, Mich.
Rhoades, R. W., Metaline Co., 50—3rd St., Long Island City, N. Y.
Shenango-Penn Mold Co., Dover, O.

BUSHINGS (Oilless)
Rhoades, R. W., Metaline Co., 50—3rd St., Long Island City, N. Y.

BUSHINGS (Steel)
Gifford Engine Co., Eaton Rapids, Mich.

BUSINESS CARDS (Engraved)
Modern Card Co., 1153 Fullerton Ave., Chicago, Ill.

BY-PRODUCT PLANTS
Koppers Construction Co., 1438 Koppers Bldg., Pittsburgh, Pa.

CADMIUM
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

CADMIUM PLATING PROCESS
The Udylite Co., 1615 E. Grand Blvd., Detroit, Mich.

CAR DUMPERS
Industrial Brownhoist Corp., Bay City, Mich.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CAR PULLERS and SPOTTERS
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CARBIDE
Linde Air Products Co., 30 E. 42nd St., New York City.

CARS (Charging)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., 1140 Ivanhoe Rd., Cleveland.
Bethlehem Steel Co., Bethlehem, Pa.

CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTINGS (Acid Resisting)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
International Nickel Co., Inc., 67 Wall St., New York City
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Forging & Casting Corp., The, Ferndale, Mich.
Industrial Steel Casting Co., 2237 Water Works Drive, Toledo, O.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

CASTINGS (Brass, Bronze, Copper, Aluminum)
Aluminum Industries, Inc., 2348 Beekman St., Cincinnati, O.
Bethlehem Steel Co., Bethlehem, Pa.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
Cramp Brass & Iron Foundries Co., Paschall Sta., Philadelphia, Pa.
Lawrenceville Bronze Co., Bessemer Bldg., Pittsburgh, Pa.
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Shenango-Penn Mold Co., Dover, O.
Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS (Brass, Pressure)
Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS (Electric Steel)
Industrial Steel Casting Co., 2237 Water Works Drive, Toledo, O.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Cramp Brass & Iron Foundries Co., Paschall Sta., Philadelphia, Pa.
Erie Foundry Co., Erie, Pa.
Forging & Casting Corp., The, Ferndale, Mich.
Forest City Foundries Co., 2500 W. 27th St., Cleveland, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
Murray Iron Works, Burlington, Iowa.
National Roll & Foundry Co., The, Avonmore, Pa.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

CASTINGS (Heat Resisting)
Driver-Harris Co., Harrison, N. J.

CASTINGS (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Peoria Malleable Castings Co., Peoria, Ill.

CASTINGS (Steel)
(**Also Stainless*)
Bethlehem Steel Co., Bethlehem, Pa.
Industrial Steel Casting Co., 2237 Water Works Drive, Toledo, O.
Mackintosh-Hemphill Co., 9th & Bingham Sts., Pittsburgh.
Mesta Machine Co., P. O. Box 1124, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
Standard Steel Works Co., Burnham, Pa.
Strong Steel Foundry Co., 33 Norris Ave., Buffalo, N. Y.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Worm & Gear Bronze)
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.

CEMENT (High Temperature)
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.
Strong, Carlisle & Hammond Co., The, 1400 W. 3rd St., Cleveland.

CHAIN (Draw Bench)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAIN (Malleable)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAIN (Sprocket)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Peoria Malleable Castings Co., Peoria, Ill.

CHAIN (Steel-Finished Roller)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHARGING MACHINES (Cupola)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.

CHARGING MACHINES (Open Hearth)
Morgan Engineering Co., The, Alliance, O.
Wellman Engineering Co., 7000 Central Ave., Cleveland, O.

CHECKS (Metal)
Cunningham, M. E., Co., 107 E. Carson St., Pittsburgh, Pa.

CHROME ORE
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia.

CHROMIUM METAL
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CLEANING SPECIALTIES
American Chemical Paint Co., Ambler, Pa.